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The Genus Syntherisma in North America.

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The genus *Panicum*, of which the plants under consideration have been and are regarded a section by some authors, is, as now generally constituted, far too comprehensive and extended, embracing too many and too diverse groups, thus making the classification of the forms arbitrary and unsatisfactory. This view has not always obtained, however. Among some of the earlier botanists and students of grasses these sectional groups were recognized as genera and the consequent result was much more logical and consistent than that reached by some of the more recent students of this family. This treatment by segregation into smaller and natural groups in our opinion is much to be preferred, and this view and the generic validity of the genus *Syntherisma* were briefly indicated by the author in this Journal a few years ago.* A more extended study, the results of which are given below, has but confirmed us in the opinion then expressed.

Scopoli † appears to have been the first to confer upon these forms the dignity of generic rank under the name of *Digitaria*. It is much to be regretted that this name, so descriptive of the plants, should not be tenable, but Heister had previously applied it to another group, thus preventing its use in this connection. The name conferred by Scopoli was also used by Haller,‡ but he

* 22: 420. 1895.

† Fl. Carn. Ed. 2, 1: 52. 1772.

‡ Hist. Stirp. 2: 244. 1768.

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attributed it erroneously to Heister and Adanson, the genus of that name in Adanson's work * undoubtedly referring to the *Tripsacum* of Linnaeus; Michaux † also adopted it, but by some mistake cited its author as Haller; Persoon ‡ followed in its use, but accredited the authorship to Richard; later still, Beauvois § maintained the genus under the same name; Pursh ‖ took the same view of the matter, but made the same mistake as his predecessor, Michaux, and cited the author as Haller; and the acute observer Elliott,¶ who did most excellent work among the grasses, came to the same conclusion. But, as stated above, Heister's previous application of the name debars its use again, although so generally adopted during the forty or fifty years subsequent to its publication by Scopoli. Walter's name, the one here adopted, seems to be the earliest available.

Trinius considered the genus a section of *Panicum*, using the name *Digitaria*, and this disposition of the group has been quite generally followed for a number of years.

But this manner of treating the matter hardly seems consistent, in view of the disposition of other groups whose grounds for separation from *Panicum* are no more valid than are those which can be pointed out for *Syntherisma*. *Paspalum*, *Anthaenantia*, *Eriochloa*, *Isachne*, *Ichnanthus* and *Tricholaena* are no more worthy of generic distinction than is this group. The characters separating them are no more marked, and in some cases not so much so. *Paspalum* in its inflorescence is readily distinguished from true *Panicum*, but the technical and arbitrary character of three scales to the spikelet is not to be relied on. For in *Paspalum bifidum* (Bertol.) Nash, a large proportion of the spikelets have four scales, thus making it technically a *Panicum*, so far as these individual spikelets are concerned. *Dimorphostachys* of Fournier is a *Paspalum* in everything but the spikelet, which has four scales.

In *Syntherisma* a somewhat similar condition of things exists. We have the inflorescence of *Paspalum* and the arrangement of the spikelets is as in that genus, but the technical character of three or four scales is utterly unreliable. In some species there

* Fam. Pl. 2: 38. 1763.
† Fl. Bor. Am. 1: 45. 1803.
‡ Syn. Pl. 1: 84. 1805.
§ Agrost. 50. 1812.
‖ Fl. Am. Sept. 1: 69. 1814.
¶ Bot. S. C. and Ga. 1: 131. 1817.

are three, in others four scales, and it often happens, especially in one or two species, that spikelets of both three and four scales occur indiscriminately in the same raceme, as mentioned above in connection with *Paspalum bifidum*.

So it will be readily seen that *Paspalum* is as closely related to *Panicum*, through *Paspalum bifidum* and *Dimorphostachys* as is *Syntherisma*, and if one is to be separated, to be consistent the other must be also. Our own view is that *Syntherisma* is more nearly related to *Paspalum* than to *Panicum*, and if its union with either genus were desirable it would certainly be with the former and not with the latter.

All the other genera above enumerated are in some forms very close to *Panicum* or *Paspalum;* for *Isachne* is only distinguished from *Panicum* by having the first as well as the second flower perfect; *Ichnanthus* has a spikelet similar to that in some forms of *Panicum*, but the fourth scale is pitted or winged at the base, sometimes rather obscurely so; *Tricholaena* differs from *Panicum* and *Eriochloa* from *Paspalum* in characters which are no more prominent or important than those distinguishing *Syntherisma;* yet all these genera are considered distinct, while such as *Trichachne*, *Brachiaria*, *Echinochloa* (certainly as close to *Oplismenus* as is *Syntherisma* to *Panicum*), *Hymenachne* and *Ptychophyllum* are relegated to that convenient repository of many modern authors, *Panicum*, although certainly as worthy of specific rank as are those previously mentioned. Would not then consistency demand that all be united with *Panicum*, or if one or more be separated, then all? The answer can hardly be other than in the affirmative.

There is one grass in this country and adjacent Mexico which has characters that ally it to the genus we have under consideration, and would at first sight make it appear intermediate between this and *Trichachne*. Reference is made to what has been called *Panicum tenerrimum* of Kunth. The spikelets do resemble somewhat those of *Syntherisma*, but the habit of the plant and the short appressed branches of the inflorescence make evident its closer relationship to the *Panicum lacnanthum* of Torrey.

The results here attained have been reached after an examination and study of the material in my own herbarium, and in the

herbaria of the New York Botanical Garden, Columbia University, and the Division of Agrostology at Washington, D. C., the latter being kindly sent to me for this purpose by Professor Scribner, to whom I desire to express my thanks for the courtesy.

Descriptions of the genus and the species and their distribution follow:

SYNTHERISMA Walt. Fl. Car. 76. 1788.

[DIGITARIA Scop. Fl. Carn. Ed. 2, **1**: 52. 1772. Not Heist. 1763.]

Usually annual, sometimes perennial, commonly tufted grasses, with simple or branched culms, flat leaves, and an inflorescence composed of one-sided racemes which are variously arranged, singly and alternate, in more or less approximate pairs, in whorls, digitate, or in various combinations of these, the rachis 3-angled, the lateral angles often broadly winged, making the rachis appear flat. Spikelets usually in pairs, sometimes in 3's or 4's, from elliptic to lanceolate, acute or acuminate, alternately arranged in two rows. Scales 3 or 4, the outer 2 or 3 membranous; first scale wanting or minute; second usually much larger than the first, rarely very small, sometimes as long as the third; third scale about as long as the spikelet; fourth scale chartaceous or indurated at maturity, enclosing a palet of equal length and similar texture.

The genus consists of some 25 or 30 species, widely distributed in warm or tropical countries. Two or three of the species are widely scattered as weeds, being almost cosmopolitan.

Key to the Species.

Rachis of the racemes with the angles naked, not winged; first scale wanting or sometimes present as an inconspicuous rudiment.

- Second and third scales pubescent with appressed glandular tipped hairs; culms simple or sparingly branched at the base; nodes 5 or less.
  - Racemes usually short, 2–10 cm. long; spikelets less than 2 mm. long. 1. *S. filiformis.*
  - Racemes usually exceeding 10 cm. in length, rarely shorter; spikelets 2.25 mm. or more long.
    - Pubescence on the sheaths spreading; racemes commonly more than 5. 2. *S. villosa.*
    - Pubescence on the sheaths appressed or nearly so; racemes commonly less than 4. 3. *S. leucocoma.*
- Second and third scales glabrous.
  - Hairs on the sheaths appressed or nearly so; nodes 5 or less.

Second scale one-half or less as long as the spikelet, rounded or truncate at the apex. 4. *S. gracillima.*

Second scale more than one-half as long as the spikelet, sparingly pilose at the acute apex. 5. *S. Bakeri.*

Hairs on the sheaths widely spreading; nodes numerous. 6. ***S. Simpsoni.***

Rachis of the racemes with the lateral angles broadly winged, thus making it appear flat; first scale usually present, generally wanting in Nos. 7 and 8.

Pedicels terete or sometimes obscurely angled, sparingly if at all hispidulous.

Sheaths and leaves strongly papillose-hirsute; rachis of the racemes .8 mm. or less wide; second scale one-half or less as long as the spikelet. 7. *S. serotina.*

Sheaths and leaves glabrous; rachis of the racemes 1 mm. or more wide; second scale nearly as long as the spikelet. 8. *S. linearis.*

Pedicels sharply 3-angled, the angles strongly hispidulous.

Sheaths strongly papillose-hirsute; racemes commonly more than 3.

Racemes very slender, the rachis usually less than .5 mm. wide; spikelets one-fifth as wide as long, acuminate; fourth scale greenish when mature. 9. *S. setosa.*

Racemes stouter, the rachis usually exceeding .7 mm. wide; spikelets one-quarter or more as wide as long, acute; fourth scale yellowish white when mature.

Spikelets usually less than 3 mm. long, the second scale one-half or less as long as the spikelet, the third scale with the first and second nerves on each side hispid above the middle. 10. *S. sanguinalis.*

Spikelets commonly more than 3 mm. long, the second scale more than one-half as long as the spikelet, the third scale with the nerves smooth. 11. *S. fimbriata.*

Sheaths glabrous or nearly so; spikelets about 4 mm. long; racemes 2. 12. *S. barbata.*

1. SYNTHERISMA FILIFORMIS (L.) Nash, Bull. Torr. Bot. Club, **22**: 420. 1895.

Panicum filiforme L. Sp. Pl. 57. 1753.

Culms 1.5–7 dm. tall, slender, erect, simple or somewhat branched, smooth and glabrous, more or less flattened; nodes 2–4: culm leaves 2–4; sheaths flattened, keeled, at least toward the apex, papillose-hirsute, or the uppermost one glabrous, at least above; ligule a scarious irregularly toothed ring 1–2 mm. long;

blades 3–20 cm. long, 1–4 mm. wide, flat, erect, usually glabrous on the lower surface, excepting sometimes in the lowermost leaves, the upper surface, as well as the margins, rough, papillose-hirsute at the base, and sometimes sparingly so a little further up: panicle long-exserted, the axis 1–3 cm. long, smooth and glabrous; racemes 2–5, 2–10 cm. long, erect or ascending, alternate, the rachis 3-angled, the angles hispidulous and not winged: spikelets about 1.8 mm. long, .75 mm. wide, elliptic, acute, on hispidulous 3-angled pedicels, in pairs; outer empty scales white or purplish, the first scale wanting, the second three-fourths to seven-eighths as long as the spikelet, 3-nerved, the margins and the internerves pubescent with long appressed glandular tipped hairs, the third scale slightly shorter than the fourth, 7-nerved, the margins and the first and second internerves on each side pubescent with long appressed glandular tipped hairs, the fourth scale deep chestnut brown at maturity, striate, obtusely apiculate; palet of equal length and similar texture.

Dry sandy soil, Massachusetts to Michigan, south to Delaware, North Carolina and the Indian Territory.

2. SYNTHERISMA VILLOSA Walt. Fl. Car. 77. 1788.

Culms densely tufted, 6–14 dm. tall, slender, erect, simple or somewhat branched, smooth or glabrous; nodes 3–5: culm leaves 3–5; sheaths flattened, keeled, at least toward the apex, the lower densely papillose-hirsute, the uppermost one sparingly so or glabrous; ligule an irregularly toothed scarious ring 1–2 mm. long; blades .7–2.5 dm. long, 3–6 mm. wide, flat, erect or nearly so, smooth beneath, rough above, the lower more or less papillose-hirsute, particularly on the upper surface near the base, the upper leaves glabrous: panicle long-exserted, the axis 3–9 cm. long, usually exceeding 5 cm., smooth and glabrous; racemes 2–8, commonly more than 5, 4–20 cm. long, generally 12–15 cm., erect or ascending, rarely spreading, alternate, the rachis triangular, the angles hispidulous and not winged: spikelets 2.5 mm. long, about .8 mm. wide, elliptic, acute, on 3-angled sparingly hispidulous pedicels, usually in 3's, in pairs toward the apex of the racemes; first scale wanting, the second and third scales pubescent with long appressed glandular tipped hairs, the second scale 3-nerved, a little shorter than the third, the pubescence on the margins and internerves, the third scale slightly shorter than the fourth, 7-nerved, the pubescence on the margins and on the second and usually also the first internerves on each side, the fourth scale deep chestnut brown when mature, elliptic to elliptic-lanceolate, striate, apiculate; palet of equal length and similar texture.

Sandy soil along the coast from Georgia and Florida to Texas; also in the Indian Territory and Illinois, and probably south along the Mississippi River.

The much longer and more numerous racemes and the larger and comparatively narrower spikelets afford characters sufficiently marked, it is believed, to warrant its maintenance as specifically distinct from *S. filiformis*, to which in some of its forms it is closely related.

3. SYNTHERISMA LEUCOCOMA sp. nov.

Culms 1 meter or less tall, rather slender, erect, smooth and glabrous; nodes 1 or 2: culm leaves about 2; sheaths somewhat compressed, keeled, at least toward the apex, coarsely striate, the lower one densely hirsute with nearly appressed hairs, the upper one much elongated, similarly but sparingly pubescent toward the base only; ligule a membranous ring 2–3 mm. long, externally somewhat pubescent; blades erect, flat, often involute when dry, glabrous on the lower surface, on the upper surface rough, as are the margins, and sparingly pubescent at the base, 3 mm. or less broad, those on the culm from 1.5–2.5 dm. long, those on the innovations 1–4 dm. long, frequently narrower and involute: panicle exserted, the axis 4–6 cm. long, smooth, pilose at the base; racemes 2–4, 2–2.5 dm. long, erect or nearly so, alternate, the rachis 3-angled, the angles hispidulous and not winged, the base sometimes branched, the branches 1.5 cm. or less long: spikelets 2.25–2.5 mm. long, .8 mm. wide, elliptic, acute, on hispidulous 3-angled pedicels, usually in 3's, in pairs toward the summit of the racemes; outer empty scales white, the first wanting, the second about as long as or a trifle shorter than the flowering scale, 3-nerved, the margins and internerves pubescent with very long erect glandular tipped hairs, the third scale a little longer than the fourth, 7-nerved, the margins and the first and second internerves on each side pubescent with very long appressed grandular tipped hairs, the fourth scale brown at maturity, striate, apiculate; palet of equal length and similar texture.

High pine land, Florida. Collected apparently only by the writer at Lake Ella, Lake Co., July 3, 1894, no. 1155.

4. SYNTHERISMA GRACILLIMA (Scribn.).

Panicum gracillimum Scribn. Bull. Torr. Bot. Club, **23**: 146. 1896.

Culms tufted, slender, 6–8 dm. tall, smooth and glabrous, the innovations about one-half as long; node 1, deep brown, 1 dm.

or less from the base; culm leaves 2; sheaths loosely embracing the culm, the lower, as well as those on the innovations, somewhat hirsute with ascending-appressed hairs, the upper sheath 4 dm. or less long, smooth and glabrous, or sparingly hirsute at the base; ligule a membranous ring about 2 mm. long; blades 2 mm. or less wide, smooth on the lower surface, rough on the upper and more or less hairy at the very base, those on the innovations 3–4 dm. long, the upper culm leaf 1.5 dm. or less long; panicle long-exserted, the axis 3–6 cm. long; racemes 2, or rarely 3, about 3 dm. long, erect, the rachis 3-angled, the angles hispidulous and not winged; spikelets slightly exceeding 2 mm. in length, about .8 mm. broad, elliptic, acute, in 2's–4's, usually in 3's, irregularly scattered, the hispidulous 3-angled pedicels of varying length united at the base, the short united portion minutely pubescent; scales glabrous, the first wanting, the second and third white, membranous, the former one-half or less as long as the spikelet, usually one-quarter as long, 3-nerved, rounded or truncate at the apex, the latter 5-nerved, acute, slightly shorter than the spikelet, the fourth scale indurated and of a deep seal brown when mature, conspicuously longitudinally striate, obtusely angled on the back, the apex apiculate; palet of equal length and similar texture; grain white, elliptic-oblong, about 1.5 mm. long.

High pine land, Florida. Apparently collected only by the writer at Eustis, Lake Co., July 6, 1894, no. 1192.

5. SYNTHERISMA BAKERI sp. nov.

Culms tufted, 1 metre or less tall, simple, erect, slender, the innovations about one-half as long; node 1; culm leaf 1; sheaths somewhat compressed, usually longer than the internodes, densely hirsute with ascending hairs, the upper sheath much elongated and glabrous toward the summit, the sheaths of the innovations shorter and crowded; ligule a scarious ring about 1 mm. long; blades 2 mm. or less wide, involute when dry, smooth on both surfaces, glabrous beneath, also above excepting at the very base where they are densely pubescent with long hairs, those on the innovations 2–4 dm. long, on the culms 1–2.5 dm. in length; panicle long exserted, the axis 4–7 cm. long, angled, the angles hispidulous; racemes usually 3, sometimes 2, commonly somewhat branched at the base, erect or nearly so, densely long-pilose at the base, 14–22 cm. long, the rachis 3-angled, the angles not winged but strongly hispidulous: spikelets about 2.25 mm. long, .8 mm. wide, elliptic, usually in 3's, on successively longer pedicels which are 3-angled, the angles strongly hispidulous; first scale wanting, the

second about four-fifths as long as the spikelet, acute or acutish, sparsely pilose at the apex, otherwise glabrous, 3-nerved, the third scale a little shorter than the fourth, 7-nerved, glabrous, the fourth scale deep chestnut brown when mature, elliptic, obtusely apiculate, rather faintly striate, enclosing a palet of equal length and similar texture.

Collected at Grasmere, Florida, by Mr. C. H. Baker, no. 47. It is closely related to *S. gracillima*, but its more densely pubescent sheaths, the pilosity at the base of the racemes, the much longer and acute second scale with its pubescent apex, and the fainter striation of the fourth scale seem to warrant the above disposition of it.

6. SYNTHERISMA SIMPSONI (Vasey).

Panicum sanguinale, var. *Simpsoni* Vasey, Contr. U. S. Nat. Herb. **3**: 25. 1892.

Culms 8–12 dm. long, more or less compressed, smooth and glabrous, branching, at first erect, finally prostrate at the base and rooting at the lower nodes; nodes numerous, deep purplish black, pilose: culm leaves numerous; sheaths loosely embracing the culm, keeled, of varying length, from shorter to longer than the internodes, copiously papillose-hirsute, the hairs widely-spreading; ligule a membranous ring 2–3 mm. long, purple at the base; blades 7–30 cm. long, 5 mm. or less wide, flat, ascending, rough on the margins, papillose-hirsute on both surfaces: panicle long-exserted, the axis 4–6 cm. long, smooth; racemes 6–8, 10–13 cm. long, erect or ascending, scattered, or sometimes approximately in pairs, the rachis 3-angled, the angles hispidulous and not winged: spikelets a little exceeding 3 mm. in length, about 1 mm. wide, elliptic-lanceolate, acute, on hispidulous 3-angled pedicels, in pairs, one short-, the other long-pedicelled, the tip of the latter usually about reaching the base of the next pair of spikelets; scales glabrous, the first one wanting or sometimes present as a minute rudiment, the second and third scales about equal in length, the former 5-, the latter 7-nerved, the fourth scale a little shorter than the third, elliptic, acute, yellowish white, finely striate; palet of equal length and similar texture; stamens red-purple, about 1.8 mm. long.

Moist saline soil, Florida. This is more nearly related to *S. filiformis* than to *S. sanguinalis*, the unwinged rachis at once excluding it from relationship with the latter. It is one of the most marked forms of this genus and certainly worthy of specific rank, to which

distinction I take pleasure in raising it, thus concurring with Mr. Simpson, of Manatee, Fla., who has long maintained its right to recognition as a species, and in whose honor the varietal name was given.

Mr. Simpson, who first brought this grass to the attention of botanists, informs me that it was originally discovered by Mr. James J. Crowley, about 1886, at Crane's Bayou, on Long Key, situated southwest of Sarasota Bay. It made a very dense and rank growth from 3½–4 feet tall, being much more vigorous along low ground, thus indicating its preference for a moist saline soil. Hay made at the above locality was taken to the vicinity of Manatee, the seed thus becoming scattered and introducing the plant into that region. It thrived in a ditch for a short time, but has now disappeared. Prior to its disappearance Mr. Simpson transplanted a turf into his own yard, which has now spread to a considerable extent. It was from this transplanted material that the specimens were made from which the above description is drawn. Mr. Simpson also informs me that he has been to Long Key three times since the original discovery of this grass, but has failed to detect it there. Mr. Crowley knew of its occurrence nowhere else but at this one place on Long Key, and from Mr. Simpson's experience in searching for it, it would appear that the only known locality for it at present is in Mr. Simpson's garden, near Manatee. It is to be hoped that it will turn up from other localities, and this will probably be the case when that little known region is more thoroughly explored and its yet hidden botanical treasures brought to view.

Dr. Vasey,* in addition to the locality above given, indicates the occurrence of this grass also in Mississippi, and cites S. M. Tracy as the collector. All the specimens so named I have seen from that state collected by Mr. Tracy belong to *S. fimbriata*. Its occurrence, therefore, outside of Florida remains to be verified.

7. SYNTHERISMA SEROTINA Walt. Fl. Car. 76. 1788.
Digitaria serotina Michx. Fl. Bor. Am. **1**: 46. 1803.
Panicum serotinum Trin. Gram. Panic. 166. 1826.
Culms 2–5 dm. long, tufted, at first simple and erect, at length

* Contr. U. S. Nat. Herb. **3**: 25. 1892.

much branched and prostrate and rooting at the lower nodes, smooth and glabrous; nodes 5–many: culm leaves 5–many; sheaths a little flattened, usually shorter than the internodes, the lower ones densely, the upper and longer one sparingly, papillose-hirsute with spreading hairs: ligule a scarious irregularly toothed ring about 2 mm. long; blades 1.5–10 cm. long, usually less than 5 cm., 3–10 mm. wide, flat, lanceolate, more or less ascending, 7–9 nerved, rough on the margins, pubescent on both surfaces with spreading hairs, the pubescence of two kinds, the one short and soft, the other longer, rigid and arising from papillae: panicle exserted, the axis 1–2 cm. long, smooth and glabrous; racemes 2–6, usually 3 or 4, 2.5–10 cm. long, commonly less than 6 cm., ascending or nearly erect, alternate, or sometimes approximate in pairs, the rachis 3-angled, the lateral angles broadly winged, the wings about .3 mm. wide, rough on the margins: spikelets about 1.5 mm. long, about .6 mm. wide, elliptic, acute, on pedicels which are terete or nearly so and glabrous, usually in pairs, sometimes in 3's; outer empty scales pubescent with long appressed hairs, the first scale wanting, the second about one-third as long as the spikelet, 3-nerved, the pubescence on the margins and internerves, the third scale a little shorter than the flowering scale, the pubescence on the margins and the second internerves on each side, the fourth scale white, ovate-lanceolate, acute; palet of equal length and similar texture.

Low open grounds, Delaware to Florida, west to Mississippi.

8. SYNTHERISMA LINEARIS (Krock.) Nash, Bull. Torr. Bot. Club, **22**: 420. 1895.

Panicum lineare Krock. Fl. Sil. **1**: 95. 1787.
Digitaria humifusa Pers. Syn. **1**: 85. 1805.
Syntherisma glabra Schrad. Fl. Germ. **1**: 163. 1806.
Paspalum ambiguum DC. Fl. Gal. 123. 1806.
Panicum glabrum Gaud. Agrost. **1**: 22. 1811.

Culms 2–5 dm. tall, slender, at length branched at the base, finally prostrate and forming large tufts, smooth and glabrous; nodes 2–4: culm leaves 2–4; sheaths flattened, smooth, glabrous, at least all but the lowermost ones; ligule a scarious ring about 2 mm. long: blades 1.5–13 cm. long, usually 3–5 cm., 2.5–6 mm. wide, flat, erect or nearly so, smooth and glabrous on both surfaces or nearly so: panicle finally long-exserted, the axis 1–3 cm. long, smooth and glabrous; racemes 2–5, more frequently 2 or 3, very rarely 5, 2–8 cm. long, usually 3–6 cm., finally widely

spreading, alternate, or approximate in pairs, the rachis triangular, the lateral angles broadly winged, the wings about .5 mm. wide and hispidulous on the margins : spikelets slightly exceeding 2 mm. long, about 1 mm. wide, elliptic, acutish, on 3-angled pedicels which are sparingly or not at all hispid at the apex, usually in pairs, sometimes in 3's ; outer empty scales usually purplish or purple, the first scale wanting or sometimes present as a scarious rudiment, the second and third scales about equal in length, slightly shorter than the flowering scale, the second scale 3-nerved, the margins and internerves pubescent with appressed hairs, the third scale 7-nerved, the margins and the second and also often the first internerves on each side similarly pubescent, the fourth scale deep chestnut brown when mature, striate, acute ; palet of equal length and similar texture.

Introduced into waste places and fields and along roadsides, particularly in sandy sterile soil, Nova Scotia to Ontario and South Dakota, south to Florida, Louisiana and Kansas.

SYNTHERISMA LINEARIS MISSISSIPPIENSIS (Gatting.).

Panicum glabrum var. *Mississippiensis* Gattinger, Tenn. Fl. 95. 1887.

Differs from the above in having usually somewhat longer racemes and the first scale of the spikelet nearly always present.

Cedar barrens around Nashville, Tenn. Up to the present this grass is known only from the collections of Dr. Gattinger, who states that it is confined to argillaceous soils, entirely disappearing on calcareous.

9. SYNTHERISMA SETOSA (Desv.).

Digitaria setosa Desv. ; Hamil. Prod. Pl. Ind. Occ. 6. 1825.

Panicum Hamiltonii Kth. Enum. Pl. 1 : 84. 1833.

Culms 4–10 dm. tall, slender, branching, tufted, smooth and glabrous, at length decumbent at the base and rooting at the lower nodes ; nodes 4–several : culm leaves 4–several ; sheaths loosely embracing the culm, usually shorter than the internodes, the lower ones short, densely papillose-hirsute with spreading hairs, the uppermost one elongated, glabrous or nearly so ; ligule a scarious ring about 1 mm. long ; blades 2–12 cm. long, 2–7 mm. wide, flat, spreading or ascending, papillose-hirsute on both surfaces, especially in the lower leaves, rough on the margins : panicle long-exserted, its axis 4 cm. or less long, smooth and glabrous : racemes 4–13, 4–13 cm. long, finally widely spreading, usually in a

whorl at the base and the remainder alternate or approximately in pairs, the rachis triangular, the lateral angles winged, the wings about .15 mm. wide, hispidulous on the margins: spikelets about 2.5 mm. long, about .5 mm. wide, lanceolate, acuminate, in pairs, occasionally with a delicate basal bristle, on 3-angled pedicels, the angles hispidulous; first scale minute, triangular, glabrous, the second scale about one-half as long as the spikelet, 3-nerved, the margins and internerves pubescent with appressed hairs, the third scale 7-nerved, the margins and second internerve on each side pubescent with appressed hairs, the fourth scale slightly less than 2 mm. long, noticeably shorter than the third scale, elliptic, greenish when mature; palet of equal length and similar texture.

Dry sandy soil, Florida. Also in the West Indies and South America.

10. SYNTHERISMA SANGUINALIS (L.) Dulac, Fl. Hautes-Pyr. 77. 1867.

Panicum sanguinale L. Sp. Pl. 57. 1753.
Digitaria sanguinalis Scop. Fl. Carn. Ed. 2, **1**: 52. 1772.
Syntherisma praecox Walt. Fl. Car. 76. 1788.
Paspalum sanguinale Lam. Encycl. Ill. **1**: 176. 1791.
Panicum ciliare Retz. Obs. **4**: 16. 1779–91.

Culms 1 meter or less long, at first erect, at length branched, finally prostrate at the base and rooting at the lower nodes, smooth and glabrous; nodes, 3–many; culm leaves 3–many; sheaths loosely embracing the culm, shorter than the internodes, the lower densely papillose-hirsute, the upper sparingly so or glabrous; ligule a scarious ring 1–2 mm. long; blades 4–20 cm. long, usually less than 10 cm., 4–10 mm. wide, flat, erect or ascending, more or less papillose-hirsute on both surfaces, rough on the margins; panicle finally exserted, sometimes much so, the axis 1 cm. or less long, smooth and glabrous: racemes 3–10, usually 5 or 6, 5–18 cm. long, commonly 8–12 cm., erect or ascending, very rarely spreading, minutely pubescent at the base, usually digitate, sometimes with an approximate pair or two above or below the whorl, the rachis triangular, the angles broadly winged, the wings .3–.5 mm. wide, hispidulous on the margins; spikelets 2.5–3 mm. long, about .8 mm. wide, elliptic-lanceolate, acute, in pairs, on 3-angled pedicels, the angles hispidulous; first scale minute, triangular, glabrous, the second scale about one-half as long as the spikelet, ovate-lanceolate, 3-nerved, the margins and internerves pubescent with appressed hairs, the third scale about as long as the flowering scale, 7-nerved, the outermost lat-

eral nerves sometimes very faint, the first and second nerves on each side, especially the second, hispid above the middle, the margins and the second internerves on each side pubescent with short appressed hairs, which sometimes finally become spreading, the fourth scale yellowish-white when mature, acutely apiculate, elliptic-lanceolate; palet of equal length and similar texture.

In cultivated places, fields, roadsides, etc., throughout North America, but principally in the north. In the south it is replaced by the following species.

11. SYNTHERISMA FIMBRIATA (Link).

Digitaria fimbriata Link, Hort. Reg. Bot. Berol. **1**: 226. 1827.

Culms 8 dm. or less long, at length branching, prostrate at the base and rooting at the lower nodes, smooth and glabrous; nodes 4–many, usually more or less pubescent: culm leaves 4–many; sheaths loosely embracing the culm, shorter than the internodes, the lower ones short, densely papillose-hirsute with spreading hairs, the upper one sparingly so or glabrous, longer; ligule a scarious ring about 2 mm. long; blades 2–8 cm. long, usually more than 4 cm., 5–10 mm. wide, flat, erect or ascending, both surfaces, as well as the margins, rough, at least toward the apex, both surfaces glabrous or more or less pubescent, the upper surface at the base also with a few long stiff spreading hairs arising from papillae: panicle long-exserted, the axis 2 cm. or less long, smooth and glabrous; racemes 2–9, usually 5–8, 2–12 cm. long, commonly 5–8 cm., erect or ascending, alternate, in pairs or whorls or various combinations of these, the rachis triangular, the lateral angles winged, the wings .2–.3 mm. wide, hispidulous on the margins: spikelets 3–3.5 mm. long, about .8 mm. wide, lanceolate, very acute, on 3-angled pedicels, the angles hispidulous, in pairs, the long-pedicelled one often more copiously pubescent with longer hairs; first scale minute, triangular, glabrous, the second scale from three-fifths to four-fifths as long as the spikelet, lanceolate-cuneate, 3-nerved, the margins and internerves pubescent with long appressed hairs, the third scale slightly exceeding the flowering scale, 7-nerved, the margins, the second internerve on each side and also often the first internerve on one or both sides pubescent with long appressed hairs which at length usually become widely spreading, the fourth scale lanceolate, very acute, yellowish white at maturity; palet of equal length and similar texture.

Dry sandy soil, District of Columbia to Florida, west to Texas

and Mexico; also from Missouri and Kansas southward. While this approaches in some of its forms *S. sanguinalis*, it can readily be separated by its longer narrower and more acute spikelets with their more copious pubescence, the longer second scale, and the smooth nerves.

12. SYNTHERISMA BARBATA (Willd.).

Digitaria barbata Willd. Enum. Hort. Berol. 91. 1809.

Panicum barbatum Kth. Enum. Pl. 1: 84. 1833.

Culms 5 dm. or less long, decumbent at the base and often rooting at the lower nodes, branching, smooth and glabrous; nodes several: culm leaves several; sheaths flattened, keeled, short, smooth and glabrous; ligule a membranous ring about 1.5 mm. long, truncate and irregularly toothed at the apex; blades lanceolate, 3 cm. or less long, 3–5 mm. wide, flat, more or less spreading, glabrous and smooth on both surfaces, or the upper surface a little rough, the margins rough, sparsely ciliate at the base: panicle long exserted; racemes in pairs, 4–6 cm. long erect or ascending, the rachis 3-angled, the lateral angles winged, the wings about .2 mm. wide and hispidulous on the margins: spikelets 3.5–4 mm. long, slightly exceeding 1 mm. in breadth, lanceolate, acute, in pairs, on 3-angled pedicels, the angles hispidulous; outer scales empty, the first scale minute, triangular, glabrous, the second and third scales pubescent with very long hairs, the second scale about four-fifths as long as the spikelet, lanceolate-cuneate, 3-nerved, the appressed pubescence, consisting of hairs thickened at the apex, on the margins and internerves, the third scale 7-nerved, in the short-pedicelled spikelet the pubescence, which is similar to that on the first scale, confined to the margins only, in the long-pedicelled spikelets the pubescence on the margins and also on the second internerve on each side, and on the internerve also a row of much coarser subulate hairs, the pubescence of the internerves finally widely spreading, the fourth scale yellowish white at maturity, elliptic-lanceolate, acuminate; palet of equal length and similar texture.

Introduced into Mississippi. Collected at Starkville by Professor S. M. Tracy on July 21, 1892, and distributed as *Panicum glabrum*.

New Plants from New Mexico.—II.

By E. O. Wooton.

Selinocarpus lanceolatus.

Perennial with a ligneous root from which arise numerous diffusely branching stems 1–2 dm. high which are slender, woody at the base, terete, tumid at the nodes, pulverulent pubescent; leaves opposite, subsessile, ovate-lanceolate, 1–3 cm. long, 5–8 mm. wide, entire, obtuse, fleshy, bluish-green color (drying dark-colored), glaucous, pubescent with small scattered scale-like hairs; flowers axillary, sessile, solitary though at first appearing geminate in the upper axils, bracts subulate: calyx tubular-funnelform, 4 cm. long including the ovary; tube slender, fleshy, hirtellous; limb light yellow with five thickened ribs: stamens 5, little exserted; filaments attached for about ⅔ of length of tube, free from just below the throat, involute in the bud; anthers 2-celled, flattened, elliptical, attached by their inner edges to the connective, versatile, dehiscent along the outer edges: fruit oblong-prismatic, 6 mm. long, with five indurated angles upon which are membranous wings 2–3 mm. wide, membranous between the angles; seed single, suspended by a 1 mm.-long funiculus from the top of the pericarp.

Collected on white soil (mostly gypsum?) just south of the White Sands, August 26, alt. 4000 feet, no. 389.

First collected by Dr. H. H. Rusby near El Rito, N. M., July, 1889 (no. 357) and referred to as *S. diffusus* Gray to which it is closely related, but from which it may be separated by its solitary flowers, and fleshy, narrower, glaucous, not scabrous leaves.

Berberis haematocarpa.

Branching shrub 1–2 m. high with yellowish sapwood, bark grayish and shreddy on the older and brownish on the younger stems: leaves inclined to be fascicled, 4–7 cm. long, pinnately 3–7-foliolate, subsessile, the proper petiole 5 mm. long or less; stipules laciniate; leaflets stiff, coriaceous, ovate to oblong-lanceolate, 1.5–4 cm. long, 5–10 mm. wide, terminal leaflets 1.5–2 times as long as others, glabrous, very little reticulated, only the more prominent veins showing, margin with 2–4 pairs of sinuate spinescent teeth: racemes fascicled with the leaves, equalling or slightly surpassing

them, 5–7-flowered; pedicels 8–14 mm. long; bracts broadly ovate, acuminate, 1–3 mm. long, persistent: fruit an oval to spherical berry of rather transparent blood-red color and pleasant acid taste, 7–8 mm. in diameter, ripening in southern New Mexico in August; seeds brownish red, elliptic-ovate, slightly flattened, 4 mm. long, 2 mm. broad.

Collected at the Mescalero Agency in the White Mountains, August 23, alt. 6300 feet, no. 376.

I first saw this plant in the Organ Mountains, August 4, 1895, in Fillmore Cañon at an altitude of 6300 feet, in company with Mr. E. N. Plank, as told by him in *Garden and Forest* **9**: 322, but it is in no way closely related to *B. Fendleri* as there stated.

But this is by no means the first time it was collected. Dr. Torrey had what I take to be this plant before him on several occasions and confused it with what he finally described as *B. Fremontii* Bot. Mex. Bound. 30.

It is *B. pinnata* Torr. Sitgr. Rept. 155 (not Lag.) from near Peach Springs, Ariz., Oct. 24, 1851, in fruit, and Emory's Recon. 137, from the Mimbres Mountains in New Mexico, Oct. 17, 1846; *B. trifoliata* Torr. in Whipples' Rept. (not Moric.) in so far as it refers to the above named specimens and probably the Gregg specimen (which I have not seen); and *B. Fremontii* Torr. Bot. Mex. Bound. 30 in part, in so far as it refers to the above named specimens, and Capt. E. K. Smith's specimen from Cañon of the Guadaloupe in southwestern New Mexico or Sonora, and Thurber's specimen from Mule Spring, New Mexico, May, 1851, no. 277. *B. Fremontii* Britton and Kearney (not Torr.) Trans. N. Y. Acad. Sci. **14**: 29. 1894, referring to Mrs. Hoyt's specimen from Ft. Apache, Ariz., *B. Fremontii* Britton (not Torr.) *l. c.* **8**: 62. 1889–1890, referring to Dr. Mearn's specimen, no. 266, from Ft. Verde, Ariz., 1884, and Rusby's specimen from Ash Forks, Ariz., June 11, 1893, belong here.

The characters of the flowers drawn from some of the above mentioned specimens are as follows:

Two ovate-lanceolate and 3 broadly ovate bracts at the base of the flower, the first adhering to the pedicel, the others sepaloid: proper sepals petaloid, obovate, 3 of them clawed, 5–7 mm. long, 3 mm. broad: petals elliptical-obovate, not clawed, slightly shorter

than the longest sepals, crisped, sometimes emarginate to retuse, with a pair of glands at the base: stamens about the length of the petals; filaments stout, appendicular teeth mere rounded projections at the base of the anthers, hardly noticeable: ovary ellipsoidal, constricted above and below, with a subsessile umbilicate stigma 1.4 mm. in diameter.

B. Fremontii is correctly characterized in Syn. Fl. 1. pt. 1. 69, as having its leaflets ovate to oblong, and the terminal one not over an inch long while the filaments are noticeably appendiculate. In *B. hæmatocarpa* the flowers are smaller, the appendages to the filaments hardly noticeable, the terminal leaflet is longer, and all leaflets are narrower.

Our plant may be *B. Nevinii* Gray, but with the short description in Syn. Fl. and only a single specimen without flowers or fruit (collected by Dr. Franceschi) at my command it is impossible to be certain. The above mentioned specimen has thinner and larger leaflets, with more numerous and weaker teeth, and is with the type from Los Angeles Co., Calif., while the range of our species, as shown by the specimens above referred to seems restricted to the mountains of New Mexico and Arizona.

FALLUGIA PARADOXA (Don) Endlicher, var. ACUMINATA.

Differing from the typical (Mexican) plant by having much more dense pubescence on the leaves and stems and sepals having but one acuminate to subcarinate cuspidate tip, while the type is described and figured as tricuspidate. Collected on the mesa near Las Cruces, July 1, alt. 4100 ft., no. 65.

Dr. Torrey figured the varietal form in Emory's Recon. Pl. 2, and all material which I have seen that has been collected in New Mexico and Arizona belongs here. Two specimens from southwestern Texas, in this herbarium, agree with Don's description and figure of the Mexican plant.

SPHAERALCEA LOBATA.

Perennial, several erect branching stems from the suffrutescent base, 1–1.5 m. high or even higher in favorable locations; whole plant scurfy with a close stellate pubescence which is easily rubbed from the stems: leaves triangular-lanceolate in outline, 6–10 cm. long, 2–4 cm. wide, even the uppermost leaves 3-lobed, the basal

ones 3–5-lobed, the middle lobe largest, oblong to triangular in outline, obtuse, lateral lobes rounded, sinuses shallow, irregularly crenate-dentate, veins prominent and very scurfy; petioles 1–3 cm. long, ascending: flowers in clusters in the axils of the reduced upper leaves forming an elongated leafy panicle; peduncles 1–3 cm. long, pedicels 3–10 mm. long; involucral bracts 3, linear-subulate: calyx-tube campanulate, persistent, 2–4 mm. long, limb of 5 ovate acute segments of same length as tube: petals obovate, 10–14 mm. long, 10 mm. broad, orange-vermilion (drying rose colored), on some plants a light pink: staminal tube antheriferous only at the top: carpels 12–15, elliptical-oblong, reticulate on sides near the base, smooth above, cuspidate, cusp 1–2 mm. long; seeds usually two in each cell, finely pubescent, slightly flattened.

Collected at Mesilla, July 14, where it is a common fence-row and ditch-bank weed. Altitude 3900 feet, no. 2.

This has been collected by most of the collectors in the southwest, for it is a common plant in that region, but has generally been referred to *S. cuspidata* (Gray) Britton (*S. angustifolia* var. *cuspidata* Gray). The most typical specimen of it in Columbia Herbarium has "*S. angustifolia* var. *cuspidata* passing to *Fendleri*" upon the sheet in Dr. Gray's handwriting. In the field it is easily separable from either of these species. *S. Fendleri* is only about half the size of either of the others, being rarely over 7 dm. high, and has deeply 5-lobed leaves. *S. cuspidata* has much the size and habit of *S. lobata*, but its upper leaves are narrowly oblong and not lobed and only the lowest leaves are obscurely 3-lobed, while all are more or less folded together along the midrib, the flowers are slightly more orange-colored, and although I watched carefully for color variation in the thousands of plants passed during the summer, I saw none whatever.

GAURA NEO-MEXICANA.

Several curved ascending stems from a ligneous root, each branching above into several erect to ascending virgate branches bearing terminal spikes; bark brown and shreddy below; whole plant villous with hairs of various lengths, spreading hispidulous on the lower portion of the stem, some of the hairs curved and subappressed upon the middle and upper parts, mostly so on the leaves, becoming finely viscid glandular and spreading upon the inflorescence: leaves lanceolate, 5–10 cm. long, 8–16 mm. wide, acute, decurrent, subsessile, subentire to slightly sinuate with a few

inconspicuous blunt calloused teeth: flowers rather large, 2.5–3 cm. long, sessile; bracts ovate-lanceolate, 5 mm. long, caducous: calyx-tube 1 cm. long, finely villous within for upper third of its length; limb of four narrowly oblong-spatulate segments slightly longer than the tube: petals obovate, 1 cm. long, short-clawed, rose pink: stamens of equal length; filaments terete, somewhat thickened, scale at base terete, obtuse, 0.2 mm. long; anthers oblong, 3 mm. long, versatile: style slightly surpassing stamens, finely villous below the middle: stigma with four terete lobes adherent to a circular indusium about half the diameter of the spread lobes; ovary fusiform, 4-lobed: fruit obovate-pyramidal, 7–8 mm. long, 3–4 mm. broad, angles rounded until mature when they are acute, a prominent single ridge upon each side reaching from the base slightly past the middle where it almost disappears, not pediceled nor tranversely rugose nor contracted at the base.

Collected on the south fork of Tularosa Creek three miles east of the Mescalero Agency in the White Mountains, July 25. Alt. 6500 feet, no. 204. It is most nearly related to *G. biennis* L.

SCROPHULARIA MONTANA.

Herbaceous annual? 1–1.5 m. high, branched above, spreading: stems acutely striate-angled, glabrous below: leaves opposite or sub-opposite, more or less broadly lanceolate, 8–15 cm. long, 2–5 cm. broad, acute, decurrent to a petiole 0.5–2 cm. long, finely glandular-pubescent especially upon the veins, lighter colored beneath, coarsely serrate with mucronate teeth or upper leaves subcrenate: inflorescence a terminal elongated panicle 2–3 dm. long, peduncle and pedicels very glandular, pedicels 1–2.5 cm. long, bracts linear-lanceolate, 1 cm. long or less: calyx segments ovate, obtuse, 3–4 mm. long, glabrous, but little united at the base, persistent: corolla ventricose-oblong, glabrous, 6–8 mm. long, 3–4 mm. in diameter, lurid purplish, the upper lip 2-lobed, projecting in the same straight line as the tube, exterior in the bud, lateral lobes shorter and spreading, lower lobe still shorter and reflexed: stamens 4, included; filaments stout, stipitate-glandular, rudiment subsessile, rounded: stigma globular, included; style glabrous, broadening at the base; ovary conical, 2-celled with thick honeycombed central placentae, disk prominent: fruit a coriaceous conical capsule 10–15 mm. long, 5–8 mm. in diameter with prominent sutures on the sides, its rounded base subtended by the persistent calyx and apex tipped by the persistent style; seeds small, numerous, brown, rugose.

Collected on Eagle Creek near Gilmore's Ranch in the White Mountains, August 5th. Altitude 7000 feet, no. 280. First col-

lected about six miles south of the above place on Ruidoso Creek, June 23, 1897.

This species is most nearly related to *S. leporella* Bicknell, but may be separated from that species by the narrower, shorter petioled, more finely toothed leaves and the generally longer and more narrowly conical fruit.

SAMBUCUS NEO-MEXICANA.

Arborescent, 3–5 m. high with erect rather smooth-barked trunk 5–10 cm. in diameter, symmetrically branched above, forming a round head 2–3 m. in diameter: leaves pinnately 3–7-foliolate; leaflets lanceolate to narrowly ovate-lanceolate, 6–12 cm. long, 2–3 cm. wide, with inquilateral rounded base, acuminate, thick, margin finely serrate-dentate; petiolules 1 cm. long or less, glabrous or puberulent: flowers cream-colored, in a flat-topped, five-rayed compound terminal cyme 1–2 dm. across; peduncles and rays glabrous and slightly glaucous: fruit black, glaucous, berries spherical, 6–7 mm. in diameter, very numerous.

Collected at Ruidoso Crossing, in the White Mountains, August 2 and 19. Altitude 6200 feet, no. 648. Also collected about five miles further up Ruidoso Creek, at an altitude of about 7000 feet, June 23, 1895.

What I take to be the same plant I found in the Organ Mountains May 15, 1892, but this sends up numerous stems without a main trunk and the young branches and peduncles are closely puberulent.

The White Mountain specimens agree fairly well with "*S. glauca* var. foliolis auguste lanceolatis" Gray, Pl. Wright. **2**: 66, from near the Copper Mines, October, 1851, and the Organ Mountain specimen agrees exactly with no. 423 of the Boundary Survey collections from Ben Moore Mountain, N. Mex., June, 1851, which Dr. Torrey refers to the plant mentioned by Dr. Gray.

This species seems to be somewhat intermediate between *S. Mexicana* and *S. glauca*, *i. e.*, taking the well-grown tree of the valleys of southern New Mexico and Arizona and northern Mexico to be the plant Presl had in mind when he wrote the name *S. Mexicana*.

S. Mexicana has broadly-elliptical to obovate, abruptly acuminate leaflets little over half as long as those of *S. Neo-Mexicana*, its fruit is slightly smaller and in southern New Mexico is

rarely seen, only a few berries on the many-flowered cymes maturing, and the trunk is always rough and gnarled. It is always to be found in the valleys below irrigation level, while our plant grows only in the mountains, so far as I have observed.

S. Neo-Mexicana seems much nearer to *S. glauca*, but its leaves are little over half as wide as those of that species and there is a noticeable tendency to puberulence upon peduncles and leaves.

SICYOS GLABER.

Annual? stems slender, 4–6 m. long, climbing over bushes, striate, glabrous except near the nodes and towards the growing ends, where they are viscid villous; tendrils 3–4-branched from a stout base 3–5 cm. long: leaves thin, 5–12 cm. long and almost as broad, 5-lobed, lobes triangular-ovate, the terminal one larger and short acuminate, mucronate, margin coarsely sinuate-dentate with mucronate teeth, deeply cordate, the sinus 2–2.5 cm. deep and 3–4 cm. wide not overlapping, upper surface scabrous with tuberculate white hairs, lower surface more sparingly hairy with weaker hairs; petioles 0.5–5 cm. long, viscid with a pubescence which follows up the main veins especially on the upper surface of the leaf: staminate flowers in strict racemes, 15–20-flowered, 1–2 dm. long; peduncles viscid, pedicels 3–4 mm. long, glabrous, somewhat recurved; flowering peduncles some distance from end of stem: calyx-teeth very small or obsolete: corolla yellow; tube broadly companulate with wide spreading 5-parted limb, segments ovate, glabrous: filaments united into a column 2 mm. long, villous, head of anthers globose, 2 mm. in diameter, little exserted, anther cells contorted; pistillate flowers in a 6–12-flowered head, peduncles 3–5 mm. long in flower, elongating to 1–2 cm. in fruit, flowering peduncles near the tip of the stem among very young leaves and tendrils; whole flower 4 mm. long, greenish: calyx-teeth wanting: corolla-tube articulated to ovary, funnelform, glabrous, limb 5-lobed: style glabrous; stigma capitate, rather large, slightly exserted, no staminodia: ovary ellipsoidal, sparingly ciliate: fruit slightly compressed, ovoid, 5 mm. long, entirely glabrous, the outer coat thin, the inner indurated, black, tuberculate-roughened.

Collected in the Organ Mountains south of San Augustine Ranch, September 1. Alt. 5000 feet, no. 606. First collected on the other side of the same mountain range September 17, 1893.

This plant belongs in the subgenus *Eusicyos* and, judging from the description, is most nearly related to *S. Galeottii* Cogn. Monog. Phan. **3**: 883.

The Histology of the Embryo of Indian Corn.

W. W. Rowlee and M. W. Doherty.

(Plate 342.)

The general appearance of the kernel of Indian corn is familiar to every one. The embryo is literally at the base of the seed and, on the side adjacent to the endosperm, has a shield-like expansion of the hypocotyl—the scutellum—which has been interpreted usually as the cotyledon. There is a close coherence between the tissue of the scutellum and the tissue of the endosperm. On this account it is difficult to separate the embryo from the remainder of the seed without destroying some of its tissue. A well-marked layer of columnar epithelial cells, belonging to the scutellum, separates the embryo from the endosperm.

The axis of the embryo consists of the radicle, which is below the point of attachment of the axis to the scutellum, and the plumule, above the point of attachment. There is no obvious hypocotyl. The radicle is completely encased in the coleorhiza or root-sheath. Unlike many other grasses there is no epiblast present in the embryo of corn.

Calyptrogen. At the apex of the root is a distinct calyptrogen from which by periclinal walls the root-cap is formed (fig. 1). The many-layered root-cap, in its younger, more internal part, consists of parenchymatous tissue without intercellular spaces; in the older, more external parts, it is loose and in many respects degenerated. The root-cap by its origin and development must be considered a modification of the epidermal tissue system.

Dermatogen. Immediately within the calyptrogen, occurs a single row of cells somewhat elongated radially and with a thick outer wall. This is the dermatogen (fig. 1), and is the formative tissue of the epidermis. In the course of development the layers resulting from divisions of the dermatogen exfoliate and the layer of the cortex, which functions as an epidermis, is designated an epiblem.

Periblem. This arises from a single layer, and indeed apparently

from an initial cell, at the apex of the root. In examining many sections, it was found that in no case did the dermatogen and periblem originate from a common initial cell. On the contrary, the initial cells of the two tissues appear quite distinct as do also the cells resulting from their divisions. This observation does not agree with that of Bowers (Prac. Bot.), who finds that "the periblem and dermatogen merge into a single layer of cells at the apex of the plerome. Thus the extra-stellar tissue of the root of maize comes primarily from a single initial row of cells."

Plerome. At the growing point the plerome consists of closely packed tissue. It soon differentiates into a peripheral region, the procambium, and a central region—the medulla. At a short distance from the apex of the plerome and well within the medulla appear rows of larger cells. Traced backward from the tip, these rows of cells are seen to increase in size much more rapidly than the surrounding tissue and simultaneous with their enlargement their nuclei break up and finally disappear altogether. After attaining full size and losing almost all their contents, their walls begin to show reticulated thickenings. Whether the agency in the thickening is the cell of the row or the cells abutting on the row, is not at present certainly known. Their appearance led at first to their being regarded as in no way related to vascular elements but the characteristic thickening points toward that relationship. They are very unique structures and so far as we can find they are confined to the grasses. Most species of grasses, if indeed not all, have them, some having only a single one in the center of the root while others, such as the species we are studying, has several of them.

The Root. For a study of the permanent structure of the root, cross-sections taken at some distance from the growing tip serve best. This shows the xylem and phloëm arranged radially (fig. 2). Strongly thickened and narrow-lumened cells make up the ground tissue which surrounds the xylem and phloëm strands. Every ray of xylem consists, in its outer part, of a group of very small elements, and, in its inner part, of very large and isolated ducts (pseudo-vessels). In each ray of phloëm the sieve tubes stand principally in a circle, the companion-cells occupying the inner part. The xylem and phloëm are separated laterally by sev-

eral rows of cells. The wide-lumened vessels toward the center are not in direct line with the outer xylem elements and stand quite isolated. They have somewhat thickened fibrous elements however, immediately around them. The medulla is made up of ordinary conjunctive tisssue.

The Stem. The bundles of the stem of corn present the well-known collateral type with the characteristic vessels, figures of which are given in most of the botanical text-books.

Transition of Bundles in passing from Root to Stem. The change from the collateral bundles of the stem to the radial bundles of the root, presents in this plant an interesting peculiarity. In tracing the course of the bundles from the root back to the stem it at once becomes apparent* that the radial type of bundle is maintained in the internode above the scutellum (fig. 3). The structure in the root and in this first internode is so similar that it is practically impossible to separate slides with cross-sections of the one, from slides with cross-sections of the other. The radial type is maintained throughout the whole length of the internode. In this respect our observations do not coincide with those of Potter (see Proc. Camb. Soc., **4**: 1883). He says "above the node," (node at which the bundles are given off to the scutellum) "we find the protoxylem the most internal part of a more or less continuous ring of xylem show that the rotation is complete." The only change in the internode that we could discover was a slight lateral expansion of the phloem strands. Sections cut directly on the other side of the second (sheath) node show true stem structure both as regards the position of the elements composing the bundles, and the distribution of the bundles through the mass of ground tissue.

Course of the Vascular Bundles in the Embryo. It will be most convenient to trace the bundles from the root backward into the stem and leaves. In the root we have the true radial arrangement of the xylem and phloëm strands. The outer edge of both strands abuts directly upon the endodermis. They maintain this position the entire length of the root. At the first node a branch is given

*This should properly be designated a false internode. The node at the insertion of the sheath appears from the description which follows to be the first true node, the scutellum node a false node.

off to the scutellum. When they emerge from this node into the first internode, they show very little change either in structure or relative position. The vessels of the xylem have moved slightly outward and the large inner elements have become smaller (fig. 3). The phloëm has spread slightly laterally. This latter change becomes more apparent as we approach the second node and is the first step in the transition from radial to collateral arrangement. In the second node the elements composing the bundles decrease. This decrease is accompanied by a bending of the bundle outward. The phoëm of the primary bundles then disappears and only a very few of the xylem elements are distinguishable. Before the disappearance of the phloëm of the root, the xylem of the leaf-trace bundles makes its appearance. These leaf-trace bundles arise, either internally or externally or laterally in close proximity to the root bundles. They pass toward the center of the stem, the xylem and phloëm elements of the bundle at once assuming the collateral position. The bundles of the sheath and the first leaf originate in the same manner.

Four collateral bundles segregate into two pairs at almost opposite points in the node, then pass out with a sharp curve into the sheath. This curve of the leaf-traces of the sheath is so sharp that in cross-section many of the xylem elements are cut lengthwise. The leaf-trace bundles of the first leaf pass inward to near the center of the stem and upward through the second internode. After traversing about one-half the length of the second internode they commence to curve outward and at the third node pass out into their leaf. In the cross-section of this node a new set of bundles much smaller than those just considered, and about equal in number to them, make their appearance. They are the bundles which pass into the leaves above. The course of the bundles in the succeeding nodes and internodes corresponds to the type of bundle distribution found in palms and other monocotyledons.

In conclusion: 1. The bundles of the primary root of Indian corn are of the true radial type. 2. The innermost elements of the xylem are anomalous and doubtfully to be considered as true ducts. These anomalous elements occur in many species of grasses but have not been met with in other orders. 3. The leaf-trace bundles of the scutellum do not in any way affect the ar-

rangement of the main bundles, and in this respect rather resemble the bundles given off to the secondary roots. 4. The first internode closely resembles the root in structure. The peculiar arrangement of the bundles may be in some way related to the failure of the first internode to attain a diameter greater than that of the primary root. 5. The fibro-vascular bundles change from the radial type to the collateral type in the second node. These bundles on entering the second node pass outward and terminate blindly toward the periphery, the last elements to disappear being the xylem elements. 6. The bundles of the sheath differ from those of normal leaves in that they originate in the node from which they are given off, that they blend into pairs and finally in the sheath appear as two bundles at opposite points on the axis, and that the curves of this bundle in the node are very sharp.

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Explanation of Plate 342.

1. Longitudinal section of root-tip. 2. Cross-section of root. 3. Cross-section of first internode. Ep. Epidermis. C. Cortex. Pc. Procambium. B. Pseudo-vessels. C.C. Plerome. R. Root-cap. En. Endodermis. Pe. Pericycle. Xy. Xylem. S. Secondary root. K. Large vessels. Pl. Phloëm.

Notes and Descriptions of North American Plants.—I.

By John K. Small.

Saxifraga Napensis.

Perennial by very short rootstocks, scapose, almost glabrous or sparingly grandular-pilose above. Leaves basal; blades thinnish (drying very thin), more or less obliquely oval or ovate, 2–7 cm. long, rounded at apex, undulate, abruptly or gradually narrowed at base, ciliate, sometimes slightly pilose on both surfaces: petioles slightly shorter than the blades or longer, broadly winged: scapes erect, slender, 1.5–3 dm. tall, loosely-paniculate-corymbose: calyx glabrous or glabrate; tube broadly turbinate, nearly 1 mm. high; segments oblong or ovate-oblong, slightly longer than the tube, obtuse or acutish, gland-tipped: corolla white, 5 mm. broad; petals broadly oval or suborbicular, 2 mm. long, rounded or notched at apex, sessile or nearly so, 5–7-nerved: ovaries united to calyx-tube, surrounded by a conspicuous lobed disk: follicles short and stout, 4 mm. high, united to each other to about the edge of disk: seeds dark red, 0.3 mm. long.

On hillsides, Napa Valley, California.

Collected by J. M. Bigelow (Whipple's Expedition) and George Thurber, no. 496.

A species of lax habit, resembling *Saxifraga claytoniaefolia* more closely than any other member of the subgenus *Micranthes*. It differs from *S. claytoniaefolia* by its broadly oval or suborbicular 5–7-nerved petals.

Saxifraga Van-Bruntiae.

Perennial, bright green, minutely glandular-pilose or glabrate below. Stems tufted, 2–7 cm. long, simple, or sometimes corymbosely branched above, leafy to the top: leaves alternate; blades linear, 4–8 mm. long, leathery, blunt, with a thick apex, sessile, turning black at the base of the plants: calyx glabrate in age; tube broadly turbinate; segments oblong or ovate-oblong, obtuse, longer than the tube, spreading: petals yellow, oblong, about 4 mm. long, obtuse, firm, more or less crisped, much longer than the calyx-segments: stamens 10, filaments filiform.

The original specimens of this hitherto undescribed *Saxifraga* were collected by Mr. and Mrs. Cornelius Van Brunt during the

past season on the summit of Sulphur Mountain near Banff, British Columbia. The species is related to *Saxifraga serpyllifolia* and *S. chrysantha*; the habit suggests those species but the stems are copiously leafy to the top and the leaves are narrower. The petals are smaller, of a much less brilliant yellow and oblong or ovate-oblong instead of oval-orbicular or obovate as they are in the two related species.

GALPINSIA TOUMEYI.

Perennial from a shrubby base, slender, bright green, puberulent. Stems branching near the base; branches erect or ascending, wire-like, 1–3 dm. long, usually simple above, leafy, pale when young: leaves numerous, sometimes clustered in axils; blades linear-spatulate to linear, 1–2 cm. long, acute, entire, with midrib prominent beneath, lower ones short-petioled, upper sessile: spikes few-flowered, leafy-bracted: calices very minutely pubescent; tube slender, 3–5 cm. long; segments about 1–5 cm. long, their free tips 5–6 mm. long: corolla yellow; petals orbicular-obovate, 1.5 cm. long, undulate: anthers linear, as long as the filaments: capsules linear-prismatic, 2 cm. long.

Arizona: Chincahua Mountains, July 25, 1894, J. W. Toumey, no. 197. Fort Huachuca, August, 1892, T. E. Wilcox.

The species just described is related to *Galpinsia Hartwegii*, but is of a much more slender build. There are minor characters in the foliage and habit, but one of the more crucial points of difference lies in the calyx, where we find the free tips of the segments 5–6 mm. in length.

LIMONIUM LIMBATUM.

Perennial, bluish green or glaucescent. Leaves basal; blades leathery, spatulate or oblong-spatulate, 0.5–1.5 dm. long, obtuse or notched at the apex, prominently nerved beneath in drying; petioles shorter than the blades or rarely longer, margined: scapes erect, solitary or several together, corymbosely branched; branches zigzag, ascending; spikes in dense terminal corymbs: bracts suborbicular or sometimes orbicular-oval, obtuse, often eroded at the apex, hyaline-margined: calyx trumpet-shaped with a flaring limb, nearly 4 mm. long; tube hirsute; segments broadly deltoid, apiculate: corollas bright blue.

In alkaline soil, Texas and New Mexico.

As far as I can learn there has been no attempt heretofore to

separate the Texan plant referred to *Limonium Californicum* either varietally or specifically. An examination of considerable material both from the Texas and the Californian districts discloses the fact that there have been two perfectly distinct species confused under the old *Limonium Californicum.* As in the case of all the species of the genus the two under consideration resemble each other in habit. The diagnostic characters are contrasted below:

Limonium Californicum. Calyx narrowly funnelform; tube glabrous; segments erect or nearly so, rounded and mucronulate.

Limonium limbatum. Calyx trumpet-shaped; tube hirsute; segments more or less spreading, broadly deltoid.

The following specimens belong here: Wright, no. 1435; Woodhouse, Zuni Mts., N. M., Aug., 1851; Wooton, no. 172.

ANDROSACE DIFFUSA.

Annual, acaulescent, more or less pubescent. Leaves basal; blades oblanceolate to spatulate or nearly linear, 1–4 cm. long, obtuse or acute, sharply serrate above the middle or sparingly toothed near apex only, sessile or with short winged petioles: scapes erect and spreading, often diffusely branched at base, 5–10 cm. long or shorter: bracts lanceolate: pedicels filiform, very variable in length, often 1–8 cm. long in the same cluster: calyx campanulate to turbinate-campanulate, 3–3.5 mm. high; segments triangular, acute, ciliate, about ½ as long as the 5-ridged tube; corolla white or pink, included, sometimes equalling the tips of the calyx-segments, 3–3.5 mm. broad; segments oblong, obtuse or retuse at apex, about as long as the tube: filaments shorter than the anthers: capsules subglobose, about 3 mm. in diameter.

In rocky soil, western Arctic America to the Dakotas, New Mexico and Arizona. Spring and summer.

For some inexplicable reason the species here described as new has always been associated with *Androsace septentrionalis* with which it has not even a habital resemblance. *Androsace septentrionalis* is a plant with strict, conspicuously elongated scapes which are surmounted by umbel-like clusters of pedicels of nearly equal length, whereas *Androsace diffusa,* has comparatively short, more or less diffusely spreading scapes, while the pedicels of the clusters are exceedingly variable in length. A more tangible

character exists in the corolla. In *Androsace septentrionalis* this organ conspicuously surpasses its calyx while in the newly described species it is shorter than its calyx or barely equals it.

ANDROSACE SUBUMBELLATA (A. Nelson).

Androsace septentrionalis subumbellata A. Nelson, Bull. Wyom. Exp. St. 28: 149. 1896.

Annual, diminutive, sparingly pubescent. Leaves basal; blades thick, oblong, 2–8 mm. long, obtuse, entire, sessile: scapes 1–5 mm. long, or wanting: bracts ovate-lanceolate or lanceolate, pedicels solitary or several together, 5–10 mm. long: calyx nearly glabrous, turbinate-campanulate, 2.5 mm. high; segments triangular, acute, slightly shorter than the 5-ridged tube: corolla white or pink, 2.5–3 mm. broad, surpassing the calyx; segments oblong, obtuse, or retuse at the apex, shorter than the tube; filaments much shorter than the anthers: capsule globose-pyriform, about 2 mm. thick.

On hillsides, near summit of Union Peak, Wyoming. Summer.

In order to treat this genus consistently, we should recognize the above as a species. On the one hand *Androsace subumbellata* is related to *Androsace diffusa:* this species it resembles in habit and foliage, but it is more diminutive in all its parts. On the other hand it is related to *Androsace septentrionalis* in having the corolla exserted beyond the calyx.

PRIMULA SERRA.

Perennial, glabrous or nearly so, deep green. Leaves basal, 5–10 cm. long; blades narrowly oblong or spatulate, much longer than the broadly winged petioles, rather regularly dentate, acute or apiculate: scapes erect, 1–2 dm. tall, solitary or several together: bracts scarious, ovate-lanceolate, acuminate, often minutely pubescent: pedicels 1–3 cm. long, glabrous in age: calices 6–7 mm. long; tube campanulate; segments lanceolate, granular-ciliate, acuminate, as long as the tube or shorter: corollas lilac-purple; tube as long as the calices or somewhat longer; segments suborbicular or obovate-orbicular, notched at apex, 7–8 mm. long, destitute of apiculations.

Primula serra resembles *Primula Rusbyi* in habit, but both the foliage and the inflorescence furnish characters for distinguishing the two species. In the case of the species just described we find

more coarsely toothed leaf-blades and shorter petioles; but more prominent characters exist in the inflorescence: The calices are twice as large as those of *Primula Rusbyi*, the corolla-tubes are comparatively stout and they never twice exceed the length of the calices as do the very slender tubes of *Primula Rusbyi*. In addition, the lobes of the corolla-segments are destitute of the minute but characteristic apiculations found in the related species.

The original specimens were collected by Mr. Pringle on damp ledges, Santa Rita Mountains, Arizona, at an altitude of 8000 feet, on July 25, 1884.

PRIMULA TENUIS.

Perennial, glabrous, bright green. Leaves basal, 0.5–1.5 cm. long; blades oblong, oval or suborbicular, undulate or toothed, obtuse or acutish, much shorter than the slender petioles: scapes erect, wire-like, 5–10 cm. tall, solitary: bracts linear-subulate, 1–5 mm. long: calices 3–5 mm. high, tubes turbinate, segments narrowly lanceolate to narrowly linear, longer than the tube, acute: corollas pink, 4–5 mm. broad; tubes surpassing the calices, 4 mm long, notched at the apex.

In moist places, Pastolic, Alaska.

A delicate species related to *Primula borealis*, but much more slender; easily distinguished by its flimsy leaves, shorter pedicels turbinate calyx-tubes and narrow calyx-segments. The corolla tube is further exserted than in *Primula borealis* and the more delicate lobes less deeply notched.

The original specimens were collected by W. H. Dall, on June 25, 1871, or 1872.

New Species of Fungi.

By Chas. H. Peck.

Tricholoma odorum.

Pileus fleshy, convex, becoming nearly plane or slightly depressed, subumbonate, glabrous, shining when young, soft like kid, yellowish or pale tan color, flesh yellow, flavor at first nutty, then farinaceous, odor strong, jessamine-like; lamellae broad, rounded behind, adnexed, easily separating from the stem, thick, white or tinged with pink; stem equal, sometimes slightly bulbous, stuffed, silky-fibrillose, colored like the pileus but pale yellow toward the base and white and pruinose at the top; spores elliptical, 7.5–10 μ long; 5–6 μ broad.

Pileus 2.5–5 cm. broad: stem 5–7.5 cm. long, 6–10 mm. thick.

Among fallen leaves in moist places in woods. Tacoma Park, D. C. Mrs E. M. Williams.

The species is remarkable for its peculiar and strong odor, which resembles that of jessamine blossoms.

Clitocybe eccentrica.

Pileus very thin, umbilicate or subinfundibuliform, glabrous, hygrophanous, watery white and shining when moist, white when dry, the thin margin often lobed, split or irregular; lamellae narrow, close, decurrent, white; stem slender, tough, solid, glabrous but strigose-hairy at the base, often eccentric, colored like the pileus, long branching strings of mycelium often permeating the matrix; spores minute, 4–5 μ long, 2.5–3 μ broad.

Pileus 2.5–5 cm. broad; stem 2.5–3.75 cm. long, 2–4 mm. thick.

Much decayed wood, Vermont. July. Prof. E. A. Burt.

Clitocybe morbifera.

Pileus thin, fragile, glabrous, convex, becoming plane or centrally depressed, slightly hygrophanous, grayish-brown when moist, whitish or cinereous when dry, sometimes slightly umbonate; lamellae narrow, close, adnate or slightly decurrent, whitish or pallid; stem short, equal, hollow, colored like the pileus or a

little paler; spores minute, broadly elliptical, 4 μ long, almost as broad.

Pileus 1.2–3.5 cm. broad; stem about 2.5 cm. long, 4–6 mm. thick.

Grassy ground and lawns. November. Washington, D. C. F. J. Braendle.

The species seems related to *C. expallens*, but the margin of the pileus is not striate as in that fungus. The taste is very disagreeable and remains in the mouth a long time. Two persons were made ill by eating it, but their sickness lasted only about three hours.

HYGROPHORUS SORDIDUS.

Pileus broadly convex or nearly plane, glabrous, slightly viscid, white, but usually defiled by adhering dirt, the margin at first strongly involute, then spreading or reflexed, flesh firm when young, tough when old; lamellae subdistant, adnate or decurrent, white or creamy white; stem short, firm, solid, white; spores elliptical, 6.5–7.5 μ long, 4–5 μ broad.

Pileus 5–10 cm. broad; stem 5–10 cm. long, 1.2–2 cm. thick.

Pine woods, Tacoma Park, D. C. November. Mrs. Williams.

A cobwebby veil is sometimes perceptible in young plants. The species is distinguished from *H. penarius* by its clear white color, though this is commonly obscured by the adhering dirt that is carried up in the growth of the fungus.

HYGROPHORUS AMYGDALINUS.

Pileus thin, convex or nearly plane, glabrous, slightly viscid when young, grayish-brown, the margin incurved, naked, odor amygdaline; lamellae thin, subdistant, adnate or decurrent, white; stem rather long, slender, solid, equal or rarely narrowed at the base, minutely scurfy or squamulose, slightly viscid, grayish-brown, paler at the base; spores oblong-elliptical, 10–12.5 μ long, 5–6.5 μ broad.

Pileus 2.5–3.5 cm. broad; stem 5–15 cm. long, 4–6 mm. thick.

Gregarious in pine woods, Tacoma Park, D. C. November. Mrs. Williams.

The species is related to *H. cerasinus*, from which it may be separated by its thinner grayish-brown pileus, its white lamellae with no pinkish hue, its grayish-brown stem and its larger spores.

• HYGROPHORUS ALBIPES.

Pileus convex, glabrous, grayish-brown, the margin strongly decurved; lamellae narrow, subdistant, arcuate and commonly very decurrent, whitish, becoming darker with age; stem slender, solid, glabrous, attenuated at the base, white without and within; spores subglobose or broadly elliptical, 5–6.5 μ long.

Pileus about 1.2 cm. broad; stem 2.5–3.5 cm. long, 3–5 mm. thick.

Massachusetts. September. Dr. G. E. Francis.

The species is related to *H. Peckii* and *H. sphaerosporus*.

• OMPHALIA AURANTIACA.

Pileus very thin, broadly convex or nearly plane, glabrous, striatulate when moist, pale orange, the margin inflexed; lamellae thick, distant, decurrent, pale orange; stem short, often curved, colored like the pileus; spores elliptical, 7.5 μ long, 4 μ broad.

Pileus 1.2–2.5 cm. broad; stem 1.2–2.5 cm. long, about 1 mm. thick.

Cespitose on old fir tree logs in woods, Portland, Oregon. February. Dr. H. Lane.

The whole plant is pale orange when fresh, but the pileus and stem lose their color to some extent in drying. The species differs from *O. umbellifera* in its cespitose mode of growth, orange color, more narrow lamellae and larger spores.

• CANTHARELLUS SPHAEROSPORUS.

Pileus thin, broadly convex or subinfundibuliform, glabrous, grayish-brown; lamellae few, narrow, distant, sparingly branched, decurrent, cinereous; stem slender, flexuous, solid, colored like the pileus; spores globose, 7.5–10 μ broad.

Pileus 1.5–3 cm. broad; stem 2.5–3.5 cm. long, about 4 mm. thick.

On the ground. Frenchman's Cove, Newfoundland. Rev. A. C. Waghorne.

• CANTHARELLUS CANDIDUS.

Pileus thin, 8–20 mm. broad, dry, hairy-tomentose, sessile, often attached by the vertex, either even, longitudinally plicate or concentrically sulcate, white; lamellae narrow, branched or sparingly anastomosing, straight, wavy, crisped or interrupted, white or whitish.

Decaying wood of birch, Frenchman's Cove, Newfoundland. August. Waghorne.

A variable species apparently intermediate between *Cantharellus* and *Trogia*.

NAUCORIA PLATYSPERMA.

Pileus convex, becoming nearly plane, glabrous, slightly tinged with ochraceous or reddish-yellow when young, soon whitish, the margin at first adorned with vestiges of a white flocculent veil, flesh white; lamellae moderately close, slightly rounded behind, pallid, becoming brownish; stem equal, stuffed with a white pith, slightly flocculent or furfuraceous above when young, whitish, the mycelium sometimes forming white thread-like strands; spores broadly elliptical, 15 μ long, 12.5 μ broad.

Pileus 2.5–3.5 cm. broad; stem 3.5–5 cm. long, 2–4 mm. thick.

On the ground, Compton, California. Professor A. J. McClatchie.

This species differs from *N. pediades* and *N. semiorbicularis*, to which it is related, by its larger broader spores and paler color.

CREPIDOTUS PUBERULUS.

Pileus thin, reniform or suborbicular, nearly plane, minutely pubescent, brown; lamellae rather broad, ventricose, rusty-brown when mature, whitish on the edge; stem short, equal, curved, lateral or eccentric, brown, with a thin suborbicular patch of white mycelium at the base; spores subelliptical, 9–10 μ long, 5–6 μ broad.

Pileus 6–10 mm. broad; stem 2–4 mm. long.

On decaying wood, Compton, California. March. McClatchie.

The species is related to *C. haustellaris* and *C. tiliophilus*, differing from the former by its darker brown color and its equal brownish stem, from the latter by its smaller size and darker and more pubescent pileus, and from both by its spores. The pileus is sometimes almost resupinate. The color of the mature lamellae is nearly vandyke brown. The spores are generally uninucleate.

CREPIDOTUS SEPIARIUS.

Pileus thin, convex, subumbilicate, even, very minutely squamulose, grayish-tawny; lamellae adnexed, minutely crenulate on the

edge, tawny; stem short, curved, generally eccentric, rarely central, brownish, sometimes mealy or pulverulent; spores broadly elliptical, 9–10 μ long; 6 μ broad, commonly uninucleate.

Pileus 4–8 mm. broad; stem 2–4 mm. long.

On oak rails, Michigan. January. Prof. W. J. Beal.

The grayish tint of the pileus is due to the minute grayish floccose squamules. Occasionally the stem is central and the pileus is slightly umbilicate.

• AGARICUS TABULARIS.

Pileus very thick, fleshy, firm, convex, deeply rimose-areolate, whitish, flesh whitish, tinged with yellow, the areolae pyramidal, truncate, the sides horizontally striate, their apices sometimes tomentose; lamellae narrow, close, free, blackish-brown when mature; stem short, thick, solid; spores broadly elliptical, 7.5–9 μ long, 6–7.5 μ broad, generally containing a single large nucleus.

Pileus 5–10 cm. broad; stem 2.5–5 cm. long, 1.5–2.5 cm. thick.

In clay soil by roadsides, Craig, Colorado. August. E. Bethel.

This species is remarkable for the peculiar upper surface of the pileus which is broken into pyramidal areas. The sides of these are marked by parallel lines in such a way that they appear as if formed by small tablets placed one upon another, each successive tablet being a little smaller than the one immediately preceding it. Only dried and broken specimens have been seen by me and the notes of the collector do not give the color of the young lamellae. There is a trace of a thick annulus on the broken stem of one specimen.

• HYPHOLOMA AMBIGUUM.

Pileus thin, convex, becoming nearly plane, glabrous, subviscid when moist, straw color inclining to pale orange, the margin in immature plants appendiculate with the remains of the white thick veil which in very young plants conceals the lamellae, but which in mature ones wholly disappears; flesh white; lamellae close, adnexed, grayish at first, changing to dark brown where wounded, becoming blackish-brown with age; stem slender, equal, stuffed or hollow, squamose near the base, paler than the pileus; spores elliptical, 12.5–15 μ long, 7.5 μ broad.

Pileus 5–13 cm. broad; stem 12–22 cm. long.

Fir woods. Portland, Oregon. November. Lane.

The dried specimens have the general appearance of some species of *Stropharia*, but the appendiculate character of the veil and the entire absence of an annulus indicate that the species is a *Hypholoma*.

GOMPHIDIUS OREGONENSIS.

Pileus at first convex, becoming nearly plane or somewhat centrally depressed, viscid, brown or dark-brown, becoming black in drying, taste sweet and pleasant; lamellæ numerous, rather close, adnate or slightly decurrent, blackish in the dried plant; stem short, solid, equal or slightly tapering upward, colored like the pileus; spores oblong, 10–12.5 μ long, 4–5 μ broad.

Pileus 5–10 cm. broad; stem 2.5–5 cm. long, 4–10 mm. thick.

Fir woods, Oregon. September to December. Lane.

Dr. Lane writes that this species is edible and grows so abundantly in fir woods that it might be gathered by wagon loads and might be made a source of an abundant food supply.

SOLENIA ANOMALOIDES.

Densely cespitose, tufts 2–6 mm. broad; cups stipitate, cyathiform, one-fourth to one-half a line broad, externally clothed with an appressed villosity, grayish-ochraceous or subcervine, whitish within, the margin incurved; spores oblong or cylindrical, 10–12.5 μ long, 3–4 μ broad.

Dead bark of plum trees. Michigan. February. Beal.

This species is closely related to *S. anomala*, but the cups are more expanded, the villosity appressed and the spores longer. Neither do the cups appear to spring from a visible floccose mycelium.

CLAVARIA NEBULOSA.

Clubs simple, closely gregarious, 2.5–12 cm. high, fragile, hollow, narrowed toward each end, isabelline or clay color, sometimes clouded with darker hues, apt to become blackish in drying; spores oblong or narrowly elliptical, 6–7.5 μ long, 3.5–4 μ broad.

Sandy soil, Sandy Point, Newfoundland. September. Waghorne.

STEGANOSPORIUM ACERINUM.

Acervuli subcutaneous; spores oozing out and forming black masses on the surface of the matrix, obovate, 50–60 μ long,

25–30 μ broad, four- to five-septate, the upper cells vertically or obliquely divided.

Bark of sugar maple, Ottawa, Canada. September. Prof. J. Macoun.

Closely related to *S. piriforme*, but distinct by its larger spores. It is perhaps this fungus which in Grevillea **2**: 153, is referred to *S. cellulosum*, but according to Sylloge Fung. **3**: 804, the spores of that species are much smaller.

SPHAEROPSIS FERTILIS.

Perithecia numerous, closely and uniformly scattered, erumpant, surrounded by the elevated remains of the ruptured epidermis, black; spores elliptical or oblong, 17–27 μ long, 12.5 μ broad.

Dead branches of green ash, *Fraxinus viridis*, Rockport, Kansas. February. E. Bartholomew.

This differs but little from *S. biformis*, except in having the perithecia more numerous and more uniform in size and position.

CHROMOSPORIUM ATRORUBRUM.

Effused, forming a thin dark red or rubiginous pulverulent stratum; spores globose, verrucose, 7.5 μ broad.

Decaying wood of pine, Ottawa, Canada. September. Macoun.

Under a lens, the spores appear to be collected in minute clusters. The hyphae are not conspicuous, the spores forming the chief part of the stratum and giving color to it. The globose spores separate it from *C. lateritium* and *C. rubiginosum*.

HYPOMYCES PURPUREUS.

Subiculum effused, purple, permeating, transforming and discoloring the matrix; perithecia minute, sunk in the subiculum, the ostiola emergent, black; asci cylindrical; spores fusiform, uniseptate, purple, with a cusp-like point at each end, 35–40 μ long, 7.5 μ broad, oozing out and forming beautiful purple masses or patches on the surface of the matrix.

Pennsylvania. August. Charles McIlvaine.

The species is similar in all respects to *H. lactifluorum*, except in color. It is apparently parasitic on some species of *Lactarius*, but the host plant is so transformed and discolored that the species is not recognizable.

HYPOMYCES INAEQUALIS.

Perithecia subsuperficial, easily separable from the host plant crowded, forming a continuous stratum, pallid or pale pinkish-brown, the ostiola prominent; asci slender, cylindrical, 125–150 μ long, 6–7.5 μ broad; spores subfusiform, hyaline, septate near the base, commonly acute or slightly pointed at the apex and obtuse at the base, sometimes acute at both ends or obtuse at both ends, 15–20 μ long, 5–6 μ broad.

Parasitic on some stout thick stemmed agaric, Maine. September. C. L. Fox.

The perithecia attack both pileus and stem and prevent the expansion of the former. According to the notes of the collector, the perithecia are at first a dingy pink or flesh color, becoming yellowish-white from the copious effusion of the spores. Sometimes the ostiola appear hyaline when viewed by transmitted light. The species is peculiar in having the septum of the spores near the base as in the spores of *Plowrightia morbosa*. This divides the spore into two unequal parts and suggests the specific name. By this character the species may be distinguished from *H. Vanbruntianus* and *H. Banningiae*.

MICROGLOSSUM CONTORTUM.

Clubs 2.5–5 cm. long, 4–6 mm. thick, cespitose or scattered, compressed, curved, contorted or irregular, dark bay or brown when moist, blackish and longitudinally wrinkled or grooved when dry; asci narrowly clavate, 87–112 μ long, about 7.5 μ broad, 8-spored; spores oblong-fusiform, hyaline, 12.5–15 μ long, 5–6 μ broad.

Deep woods, Rock Creek Park, D. C. May. Mrs. Williams.

Allied to *M. multiforme*, from which it differs in its larger size, larger spores and its usually tufted mode of growth and irregular twisted or contorted clubs.

Mycological Notes.—III.

By Byron D. Halsted.

Relation of Bacteriosis to outward Conditions.—Some notes that may be of interest to mycologists were made upon a plot of bush beans during the past season. The rows ran nearly north and south and upon the east side of the plants there was but a

Fig. 1.

small amount of the bacteriosis, due to *Bacillus phaseoli* Sm., to be seen while upon the west side nearly every pod of the "green flageolet" variety was more or less blotched, many of them literally covered with the bacterial ulcers. The engraving, figure 1,

shows two sample pods split to expose both sides, the upper in each case being healthy and grown with an eastern exposure, while the western halves of the same pods are shown below their respective mates, and were badly diseased. The ulcers were in many instances of an amber color, due to the multitude of the germs of the bacillus that had collected in a layer upon the surface.

Fully nine-tenths of all the blotches were upon the western sides of the pods and about two-fifths of all the pods of the variety in question were badly affected.

Strong winds upon the 17th and 20th of September bent the plants to the southeast, from which they did not fully recover. As a result, at the time the above observations were made, October 5th, the plants all leaned several degrees from the perpendicular and some of the pods were likewise tilted. In short, the foliage of the plants hung chiefly upon the eastern side of the row and had done so for between two and three weeks, and therefore one side of each pod was more exposed than the other, and that exposure was, speaking generally, in the direction of the four o'clock sun.

It had been previously observed that the leaves of the plants under consideration were badly blighted for weeks before the pods became noticeably injured, and it is not unlikely that the germs were carried from the diseased leaves to the pods by the dripping dews, in which case the side that was slightly inclined upward on account of the slanting posture of the plants would receive a more generous supply of the germs than the more protected underside.

It is possible that the bending of the plants so exposed the pods that they became more or less injured by the sun and thus provided more favorable conditions for the development of the bacteria. The warmth of the sunny side may have been sufficient to make the difference observed.

All the circumstances may have combined to bring about the results that were so strikingly evident. The bending of the plants and the swinging of the foliage to the eastward, the inclining of the pods and the exposing of the upper surface, that would naturally receive the drips from the diseased leaves, the autumn sun during the afternoon, either adding the required warmth for the germs or partially scalding the side most exposed and thus render the tissues more susceptible to attack are all still open questions.

One cannot but wonder what the result might have been had the plants been pressed back into place after the storm or a portion of the plot been shaded or even if the rows had run east and west instead of north and south.

The Hollyhock Rust.—Mr. J. A. Kelsey, Assistant at the plant hospital, brought me upon March 23d some badly rusted hollyhock leaves from the ornamental grounds of a person living in the suburbs of New Brunswick. The teleutosporic sori of this rust (*Puccinia malvacearum* Mont.) are very prominent and stand up almost like beads from the surface of the leaf. They are more abundant upon the under than the upper side of the leaf, but may arise anywhere even upon the long petioles.

Upon the leaves examined the sori were in all stages of formation, from the mere yellow orange discoloration of the affected tissue to the fully developed, nearly spherical masses of teleutospores. These latter are at first of a light brown color, but the point of most interest in this connection was the gray appearance possessed by many of the sori, particularly upon the upper side.

The first thought upon noticing this wide difference in color, namely that the spores were undergoing germination proved correct, for upon making a microscopic examination the upper cell of each teleutospore in a majority of cases had sent out its promycelium and developed the sporidia. It was the luxuriant growth of these hyphae and spores that had given the peculiar appearance to the sori that under a hand lens looked as if attacked by some delicate mould.

It would seem that this species of *Puccinia* produces teleutospores in very early spring, and that these germinate at once and by the time the hollyhock is ready to form new leaves there is a large crop of sporidia ready to infect them.

No signs of any aecidium form is met with in connection with the Hollyhock rust, and the uredo is apparently absent, making this species one of the Leptopuccinia group. The fungus winters as hibernating hyphae in the tissue of the rosette of leaves and start into full vigor at the first suggestion of spring.

During this season the hollyhock rust has been used for class demonstrations of promycelium and sporidia instead of the *Gymnosporangium macropus*, which it precedes by several weeks, and

is altogether more satisfactory because it can be easily cultivated for weeks in the laboratory.

Witches Broom upon Asparagus.—The "witches broom" of the cedar caused by species of *Gymnosporangium* and of the

FIG. 2.

cherry by *Exoascus cerasi* (Fl.) have received their full share of attention in works upon fungi; but the writer fails to note any mention of a similar growth upon asparagus.

During the past year while visiting various fields in a study of the rust (*Puccinia asparagi* DC.) it has been observed that in many instances asparagus plants otherwise entirely free from the rust would have one or more diseased tufts and these assumed an appearance that at once suggested the "witches brooms" of cedar and cherry trees, although upon a much smaller scale.

There seems to be no order as to their appearance, as sometimes they are near the tip of the main branch and again they are here and there along the stem as malformed lateral shoots. The engraving (figure 2) shows a small branch upon which there are two rusted twigs. The one at *a* is the lowermost branch of a side shoot, all other portions of which are normal. At *b* is shown a second rusted and dwarfed branch, while next above it is a normal twig. The differences between the infested and healthy branches are well shown in the engraving made from a sun print of the subject and one-third reduced. In the diseased parts the "leaves" while more numerous are not about half the ordinary size and there is a strong tendency to produce side branches and thus form the "broom." Sometimes the diseased branch develops so that there is a decided tuft, which tends to grow upright even if the main branch bearing it is more or less inclined. This tendency for a fungous infested branch to be perpendicular is as well illustrated in these "brooms" as in case of the prostrate euphorbias attacked by *Aecidium* or the common purslane when badly infested with white mould (*Cystopus portulacae*).

In case the asparagus plant is inoculated as its young succulent stems come above ground there is but little chance of "brooms" to form and they therefore are generally met with in beds where the spores have not reached the plants until they are approaching full growth. The local disturbance indicates a local inoculation and the malformation shows how rapidly the fungus spreads in the host.

The Rose Speck.—Recently it was my privilege to visit a brand new greenhouse in which a middle bed of roses had recently been set out. The leaves of these plants were nearly all dotted over with minute circular black specks smaller than the head of a bank pin and jet black. The gardener was exercised over the sudden appearance of these numerous specks and desired a preventive.

The specks upon examination were found to be filled with spores, and, therefore, the dark somewhat oval circular dots were of fungous origin. It was also observed that the clean white woodwork of the greenhouse was also spotted in the same manner as the plants.

The fungus in question is *Pilobolus crystallinus* Tode., which is one of the Mucorini that had grown upon the horse manure used liberally in the bed and covered the surface of the soil under the rose bushes. This fungus produces its spores in black sporangia that are at maturity thrown to a considerable distance by the enlarged portion below the sporangium filled with liquid suddenly collapsing as the spore case leaves the tip of the filament. In this manner in the greenhouse in question the sporangia have been thrown upward to the roof, ten feet above the bed of manure, and the glass was spotted with the adhering spore specks.

Along one side of the rose bed is a glass partition wall and upon this was a record of the distance to which a majority of the sporangia may be thrown. Between two and three feet seemed to be the average distance or range of the mycological mortars in this microscopic bombardment.

It is scarcely necessary to state that the gardener's mind was put at ease when he determined the cause of the disfigurement of his rose and other neighboring plants.

Rust of the Safflower. During August, 1895, while spending a few days at Cottage City, Massachusetts, the writer's attention was attracted to a row of safflower (*Carthamus tinctorius*) growing in the quaint kitchen garden of a humble family of foreigners, probably Russians. The safflower plants, sometimes called false saffron, were probably grown both for their curious spinose orange heads of flowers and the dye that is contained therein. But it was the exceedingly distressing condition of the plants as a whole that made me look a second time over the extemporized garden fence of lath and various sticks. This led to a call at the house for the privilege of a closer inspection, which I trust was granted; however, no intelligible words passed between the owner and the visitor to verify the fact.

In short, the plants were found to be badly infested with a fungus that, upon microscopic examination turns out to be

Puccinia carthami Corda. Notice is here made of this find, for it appears to be the first time that this rust has been taken in the United States. The host plant is so rarely grown that it is not likely to be frequently met with. It is curious that in this foreign garden a rust should have developed so extensively as to show itself upon nearly every leaf, and doubtless had nearly ruined the crop. Possibly it came in from the native country in the seed of the *Carthamus*, or it may be some of the herb-leaf, branch and flower as a coloring material accompanied the immigrants. Saccardo records it for Silesia and Bohemia.

New Species of Sapindaceae from South America.

By Prof. Dr. L. Radlkofer.

Allophylus cinnamomeus.

Inter Allophyli species Americanus; foliis 3-foliolatis et inflorescentiis pluriramosis praeditas molliter pubescentes excellit, pube ramorum petiolorumque brevi cinnamomeo, foliolis breviter petiolatis, serrulatis, inflorescentiis fere a basi ramosis, floribus majoribus. (Fructus desunt.)

Legit M. Bang, Bolivia, n. 2236.

Matayba Boliviana.

Arbor 15-pedalis; rami teretes, novelli pube adpressa gilvo-cinerea induti; folia abrupte pinnata, 3–4-juga (ad 18 cm. longa); foliola subopposita, oblonga (circ. 8 cm. longa, 2.5 cm. lata), obtusa, integerrima, basi inaequaliter in petiolulos breves attenuata, subcoriacea, laevigata, nervis lateralibus numerosis oblique patulis venisque supra vix, subtus paullulum tantum prominulis, utrinque livescentia, subglabrata, sparsim pellucide punctata et lineolata, ad paginem superiorem hypodermate instructa; paniculae axillares, folia subaequantes, pubescentes; flores albi, disco glabro.

Affinis *Mataybae sylvaticae* (Casar) Radlk. in Sitzungsber. K. bayer. Ac. **9**: 631, 1879, a qua differt forma et colore foliolorum, indumento pallido et praesertim foliolis hypodermate instructis.

In Bolivia, legit M. Bang, n. 2171.

"Grows as a shade tree on the banks of streams, in rich forest mold. But one tree seen." *Bang. coll. notes.*

Serjania grandiceps.

Scandens, fruticosa, subglabra; rami acute 3-angulares, 3-lateri, lateribus inter angulos et costam medianam utrinque canaliculato-sulcatis, necnon angulis ipsis sulco angustiore exaratis, vix extimo apice laxepuberuli; corpus lignosum compositum e centrali majore et peripheriicis, parvis 6-triangulariter dispositis et per paria angulis sulcatis subjectis; folia biternata (circ. 14 cm. longa, 10 cm. lata); foliola ovalia (terminalia 8 cm. longa, 4 cm. lata, reliqua decrescentim minora), acuta, subpetiolata, supera medium remota serrato-dentata glabra, punctis pellucidus sparsis lineolisque reticulatis notata; petioli nudi; thyrsi elongati; flores magni; pedicellis (1 cm.) longis suffulti; sepala flavescenti-tomentelli (6 mm. longa); petala ex obovato in unguem longiorem attenuata (8 mm. longa, 4 mm. lata); stamina hirsuta; germen pyriforme, dense flaves-

cente-tomentosum; fructus magnus (4.5 cm. longus, medio 3.5 cm. ad loculos 1.5 cm. latus), cordato-ellipticus, loculis globosis, sat liberis, reti venarum elevato notatis, subhirsutis, endocarpio crispato-piloso (semen non suppetebat).

Affinis vindetur *Serjaniae glabratae* Kunth; floribus serjaniam nutantem in mentem revocat, sed germen densius tomentosum; insignis est ramorum structura.

In Bolivia, legit M. Bang.

PAULLINIA DASYSTACHA (sp. nov. in Paulliniae Monographia mor fusius tractanda) in Sectione XII., "Caloptilon" (capsula trialata, alis endocarpii ingressa chartaceis persistentibus sepalis 5 liberis) quodammodo affinis *P. acutangulae* Pers.:

Tomentosa; rami subteretes; corpus lignosum simplex; folia 5-foliolato-pinnata; foliola ovato-oblonga, remote obtuse dentata, raro-punctata, epidermide non macigera; stipulae elongatae, sublanceolatae; thyrsi solitarii, rhachi tomentosa; fructus obvatus, truncatus vel emarginatus, breviter et stipitatus, alis basi angustatis, tomento brevi indutus; seminis testa parve pilosa.

Forma 1, *genuina* Radlk.: Dense hirto-tomentosa.

Forma 2, *hirta* Radlk.: In omni parte brevius et laxius tomentosa.

In Bolivia et Peruvia: Forma 1: Ruiz & Pavon! (Peruvia); Bang n. 2815! (Bolivia). Forma 2: Rusby n. 531: (Bolivia, Guanii, alt. 2000 ped., Maj. 1886, fruct.; *Paullinia acutangala* non. Pers., Britton in Bull. Torr. Bot. Club, **16**: 190, 1889; partim, excl. nempe coll. Rusby n. 530 !, quae partim *Paullinia neglecta* Radlk. in Serg. Monogr., 1895, p. 42 et 71 n. 29, partim *Serjania Caracasana* Willd.

CUPANIA SEMIDENTATA.

Affinis *Cupaniae triquetrae* A. Rich. Fructu (potius germine aucto) subtriquetro et foliolis ad paginem superiorem hypodermate instructis, sed distincta indumento fructuum cano setoso-sericeo adpresso (nec flabescente lanoso-tomentoso) et foliolis elongate oblongis supra medium tantum crenato-dentatis, subglabris (nec ex obovata cuneatis, a basi repando-dentatis vel subintegerrimis, subrevolutis, subtus tomentellis); foliolis 7–9, alternis, brevi-petiolulatis, 10–20 cm. longis, 4–8 cm. latis; panicula longi-pedunculata, laxiuscula, circa 20 cm. longa, 10 cm. lata.

Collected by Rusby and Squires at Sacupana, lower Orinoco. A small tree of some 6–10 meters.

Two new Species.

By A. A. Eaton.

On August 26, 1896, while collecting the peculiar large form of *Spartina patens* growing on the border of the marsh at Seabrook, N. H., I noticed a taller, more slender plant growing in a clump of bushes. An examination showed it had many peculiarities, and an extended search on the 27th revealed numerous patches, and also showed beyond a doubt that it was a heretofore overlooked species, with external appearance of *S. patens*, with which it has doubtless been confounded. After once noticing it, however, one can distinguish it at sight.

Though growing in rough ground just at the edge of the marsh where it is never mown, it bears an abundance of leaves and seems to be preferred by cattle to *S. patens*, as I have repeatedly seen it cropped to the woody base, while *S. patens* growing beside it was untouched. The reason for this may be that it does not secrete so much salt on the upper surface of the leaves, owing to its growing where there is less in the soil. I will mention in passing that salt on various grasses growing in salt marshes is popularly supposed to be the residue from evaporated sea water. This is not so. That it is a true excretion of the plants is shown by the fact that in dry seasons on a low run of tide it is most abundant, and sea water will remove it as well as rain. Moreover, I have seen *Sporobolus airoides* and *Distichlis spicata* growing in alkaline soils in San Joaquin valley, California, where they had been several months without rain, whose leaves were more copiously supplied with salt crystals than I have seen *Spartina stricta* even, in the eastern marshes.

SPARTINA CAESPITOSA. "Highwater Grass."

Plants caespitose, forming tussocks 3 dm. across, which are scattered 6–9 dm. or more apart. Rootstocks 2.5 cm. or less long, closely covered with short, broad, hard, shining mucronate scales, imbricated in two lateral rows, and sending up several branches at the end: culms very many, clustered 4–15 together at tip of rootstock, 6–12 dm. high, very smooth and glabrous, purplish where

exposed, slender at base, usually lying flat at maturity, and geniculate above at two upper joints: sheaths smooth, much exceeding internodes below, equalling them or a little shorter above: leaves 4 or 5, usually secund, approximate near middle of stem, open, with distinct midrib, often keeled, about 6 mm. broad, involute when dry, glaucous above, yellowish green below, becoming reddish or purple as they ripen, lowest 1 dm. long, dead at flowering time; middle about equalling the culm, 2–6 dm. long, upper 2.5–10 cm. long, reaching base or middle of panicle, all with long involute scabrous points: (there is a small joint or knot in the leaf at about the upper third, more noticeable when dry, above which several of the nerves are scabrous, and the leaf tapers to a long filiform scabrous point) spikes usually 3, often 8, 2.5–3.5 cm. long, spreading, becoming erect but not appressed, 20–30-flowered, the common rachis very bristly on edges above, roundish and nearly smooth below: spikelets 1–1.2 cm. long, sessile or nearly so, lower glume two-thirds length of upper, or with its short rough awn point five-sixths as long, rough scabrous on back: second glume very rough-scabrous on back and gradually rough awn-pointed, the edges scabrous above top of palet: third glume with midvein rough-scabrous above middle, ending below the tip in a very scabrous point: palet hyaline, little or not at all longer than upper glume, two-thirds as long as middle one, boat shaped, finely scabrous above on midvein.

Differs from any form of *S. patens* by the cespitose habit, long, open, filiform-tapering, scabrous, erect leaves, scabrous common rachis, flowers sessile in lower glume, (stalked in *S. patens*) and empty glumes both more scabrous and rough awn-pointed, the second very prominently so.

In brackish, rather dry and firm soil at borders of marsh where wet by tide a few times a year, associated with *Elymus Virginicus*, *Panicum virgatum*, *Eleocharis rostellata*, and other coarse grasses of such places, often among bushes at border; one tussock at Seabrook, N. H., Aug. 26, 1896, species subsequently traced on both sides of marsh from Hampton, N. H., on the north, to Ipswich, Mass., on the south, most abundant at the causeway, Salisbury, Mass.

Eriophorum gracile Koch. is with us in condition to collect on June 1st. In the spring of 1896 I put off my trip for it till June 12th, when it was dead ripe. On June 29th, I noticed in two localities, Salisbury and Amesbury, Mass., an *Eriophorum* re-

sembling it just coming into flower. I subsequently found it at Byfield, Mass., North Hampton, Hampton Falls, Seabrook, Nottingham, N. H., and several other localities, ranging in time from June 29th, when, as said, it was just developing, to August 10th, when its seed was all shed.

A reference to the fifth edition of Gray's Manual showed it was *E. gracile* var. *paucinervium* Eng. The sixth edition ignores it entirely or combines it with the type, and Britton & Brown, I., 273, figure and describe it as *E. gracile*.

Mr. M. L. Fernald of Harvard, to whom I referred the matter, kindly furnished the important literature on the species and variety, as well as a list of localities as represented by specimens in the Harvard Herbarium. From this it appears that *E. gracile* is spread from Newfoundland to Washington, south to about the 40th parallel, while the other reaches from New Brunswick to Illinois, no account of its being found farther west being at hand; while Watson (Bot. Cal. **2**: 220) certainly describes *E. gracile*, and Coulter (Text-book Western Bot. 368) may or may not include both. A careful study of an abundance of material from several localities shows this is entitled to specific rank.

Inasmuch as confusion exists as to the characters of *E. gracile*, which is certainly comparatively rare, it is best to give descriptions of both.

ERIOPHORUM GRACILE Koch. Roth. Catal. II (1799) addend 259.

Culms 3–6 dm., slender, terete or nearly so, smooth throughout, sending off from base lateral rhizomes, which become established as new plants and then send up 2–4 very slender channeled triquetrous solid leaves, 1.5–4.5 dm. long, from rather tight nodulose sheaths. The next year the culm is pushed up from within this crown of dead leaves, without any new radical leaves appearing; culm leaves mostly but one, never more than two, 1.5–2.5 cm. long, solid, bayonet-shaped; involucral scales 1–2, dull lead colored, the lower usually with a very short triangular-bayonet-shaped point, strongly several-nerved; spikes 3–4, one usually raised on slender smoothish pedicel, 0.5–5 cm.; outer scales broadly ovate, narrowing within to lanceolate, obtuse, dull lead or slate colored; bristles numerous, 1.2–1.5 cm. long.

May 25–June 10.

ERIOPHORUM PAUCINERVIUM (Engelm.).

E. gracile, var. *paucinervium* Engelm. Am. Jour. Sci. **45**: 105. 1846.

Larger every way than *E. gracile*. Culms 4.5–10 dm., stouter, obtusely three-angled, scabrous above upper leaf, sending off at base after flowering one or more slender rhizomes, each of which develops at tip into a new plant, and sends up 5–6 nodulose leaves 3–7.5 dm. long, 3–4 mm. wide, open, flat, or closed in drying, scabrous margined on a loose, more or less nodulose and fibrillose sheath; culm and 2–3 radical leaves develop next year from center: culm leaves 2 or 3, flat, with solid point sharply triangular in section, keeled below, mostly closing like a book when dry, lower, 2–3 dm. upper 0.5–1.5 dm. long, scabrous on edges: involucral scales 2, larger than *E. gracile*, lower usually 1.2 cm. long, with stiff triangular blade 2.5 cm. long or more; spikes 4–5, larger and more densely flowered than *E. gracile*; one or two usually raised 1.2–2.5 cm. on scabrous pedicels; outer scales ovate, inner narrower, obtuse, light yellowish brown or red tinged, with green midrib; bristles most abundant, 2–2.5 cm. long.

July 1–August 1.

E. paucinervium was so named by Engelmann to distinguish this plant from the European var. *pleurinervium*. He gives Illinois, Ohio and Pennsylvania as its habitat. The Harvard Herbarium contains specimens from St. Francis, Me. (Fernald), Rumford, Me. (Pailin), Wisconsin (Schnette), New Brunswick (Fowler), Beardstown, Ill. (Geyer).

About here it occurs in every place where *E. gracile* grows and in several localities where that does not. It grows often in water and sphagnum on water quaking bogs, while *E. gracile* prefers a firmer foundation. To summarize: It is about twice as tall as *E. gracile*, intermediate in robustness between that and *E. polystachyon*. The culms are more sharply angled, the leaves long, flat or channeled, while *E. gracile* has short, solid, bayonet-shaped ones. Its peduncles are rough and pedicels bristly, while both are smooth or nearly so in *E. gracile*. Its involucres are long bladed, scales lighter colored, cotton more copious and longer, and it is about five weeks later in fruiting.

SEABROOK, N. H., March, 1898.

Vitis labrusca and its westward Distribution.

By E. J. Hill.

Having found this grape the past summer growing wild in the woods of the dune region of Lake and Porter Counties, Ind., the question arose as to its range, since published statements are somewhat contradictory. In the last issue of the "Synoptical Flora of North America" (1897),* Professor Bailey says: "Not known to occur west of eastern New York in the north, but reported from southern Indiana, *Munson*." He remarks on the ease with which it may be confounded with *V. aestivalis*. In the Catalogue of the Plants of Indiana (1881), by the editors of the Botanical Gazette, it is reported from Jefferson County, which is in the southeastern part of the state bordering on the Ohio River. In the "Catalogue of the Flora of Minnesota" (1884) by Warren Upham, it is said to occur "frequently according to *Clark*, in the eastern part of the state as far northward as Pine County (Upper St. Croix), and rarely on the St. Louis River (Head of Lake Superior), Lake Pepin *Miss Manning*." Britton and Brown, in their "Illustrated Flora" (1897), give its range from New England to Minnesota, Georgia and Tennessee. Dr. Engelmann in The True Grapes of the United States, 1883,† says of it: "This species usually known as the Fox-Grape, or Northern Fox-Grape, is a native of the Alleghany Mountains and of their eastern slope to the southeast, from New England to South Carolina, where it prefers wet thickets or granitic soil. Here and there it descends along streams to the western slope of the mountains, but it is a stranger to the Mississippi Valley proper." "Large and downy-leaved varieties of *V. aestivalis* are in the west and southwest not rarely mistaken for *Labrusca*." Accordingly in some of his papers on *Vitis* he corrects such determinations as came to his notice.

In another paper the following statement is made: "*V. Labrusca* is our most local species, being confined to the Alleghany Mountains and the region between them and the Atlantic, unknown in the Mississippi Valley or beyond. Whatever has been called so there, or in Louisiana or Texas, is a large and downy-leaved form of *aestivalis*, always readily distinguished by its 'intermittent' tendrils, while *Labrusca* has more or less 'continuous' ten-

* 1[1] : 430.

† Botanical Works, 420.

drils." * Since Dr. Engelmann was a very careful student of this genus, the question may be legitimately asked whether the determinations of the western forms were in all cases correct, and a careful inquiry should be made in those regions where it is said to occur. It is easy to confound *V. aestivalis* with *V. Labrusca* in the dune region if one were to base the determination on some forms of the leaves of the former species But the arrangement of the tendrils and especially the fruit clearly distinguish the two. I was greatly surprised that it had been overlooked so long in a region which is often visited by collectors, and was at first inclined to regard the vines as escaped from cultivation. But they were found in several localities, covering quite an area in one place, with vines running up on the trees thirty feet or more. But the fruit conformed in all respects to the wild type, and it would be necessary to assume a complete reversion to the wild state to explain their presence in the Lake region by this hypothesis. They were met with both in the dryer sands and damp thickets, the latter taking the greater number seen. As the sands are siliceous the two habitats agree very well with those given by Dr. Engelmann. The fruiting vines were relatively few. The berries were large, even larger than the average Concord grape of the market. Some were slightly depressed-globose, others a little elongated or plum-shaped. They varied in color from black to vinous purple, were without bloom, and though of good flavor and quite palatable they had the tough skin and pulp and the large seeds of the wild form. Some were sent to Prof. L. H. Bailey, who expressed surprise that they were found in this locality.

* Bull. Torr. Bot. Club, **6**: 234. 1878.

Two Southern Plants.

By Thomas H. Kearney, Jr.

Monotropsis odorata Ell.

This little-known and attractive plant has been noted heretofore only at a few scattered localities east of the Alleghanies. I am now able to report a station for the species on the western slope of the Alleghanies, at Wolf Creek Station, Cocke County, Tennessee. While stopping at Wolf Creek last summer a "small leafless plant with the odor of violets" was described to me as growing in a ravine on the farm of my host, Mr. Allen, which I fancied could be none other than the *Monotropsis*. I requested that specimens be sent me when their flowering time should arrive, and to-day, April 6th, a number of plants reached me in excellent condition. The species has also been reported from Rugby, Morgan county, Tennessee, on the Cumberland plateau, a considerable westward extension of its range.

Stylosanthes riparia Kearney, Bull. Torr. Bot. Club, **24**: 565. 1894.*

Dr. Charles Mohr sends me excellent specimens of this *Stylosanthes* collected at Auburn, Alabama, by Profs. Earle and Baker (129), July 8, 1897. They differ from the type in the somewhat longer and more abundant pubescence of the stems; in the longer (by .5–1 mm.) secondary bract and prophyllum, the latter cleft very nearly to the base; and in the usually somewhat longer lowest calyx-tooth. Occasionally the prophyllum of the lowest flower of the inflorescence is undivided, although in every inflorescence examined the other prophylla are constantly deeply cleft. No other differences were detected. *S. riparia* is represented in the Biltmore Herbarium by specimens from Delaware,† eastern North Carolina and Florida, all of them showing the deep cleft in the prophyllum, except that from Delaware, in which the prophyllum is not constantly cleft.

* In the paper cited the following errata are to be corrected: P. 567, in the twenty-third line read "stems" instead of "culms;" p. 569, under *Rhododendron maximum*, read "1.5 m.," instead of "1.5 mm.;" p. 570, under *Vaccinium melanocarpum*, read "14 dm.," instead of "4 dm."

† C. D. Beadle; Bot. Gaz. **25**: 279. 15 Ap. 1898.

Proceedings of the Club.

TUESDAY EVENING, MARCH 8, 1898.

The club met by invitation at the Teachers College, where the science lecture rooms, laboratories and library were thrown open to its inspection and use, with reception and refreshments following, in which the ladies connected with the Teachers College staff dispensed their kind hospitality.

President Brown presided. About 140 persons were present.

The scientific program consisted of a lecture by Prof. Francis E. Lloyd, of the Teachers College, on the trees of the Pacific coast, illustrated with lantern slides taken by himself. He discussed the characteristic Pacific trees found between California and Sitka, especially those of the Olympic Mountains, showing among others the western representatives of the white oak, black ash and flowering dogwood. The Douglass Spruce, the western maple (*Acer macrophyllum*) and others were shown both in their regular closer-branched field-forms and in their irregular narrower forest-forms. *Abies grandis*, the White Fir of the West, and *A. lasiocarpa*, the Woollycone Fir, were shown from the Olympic Mountains. Pines occur there at the altitude of 5,000 feet and over, as *P. albicaulis*, the White-trunked Pine, bearing a round cone with thick, fleshy scales. Its seeds are the food of a curious crow inhabiting these mountains. This pine loves exposed situations, and also about Crater Lake, but always cowers under the wind, often forming a dense, broad, low mass on which one can lie as on a spring bed, perhaps 800 years old, while but four or five feet high. A curious contrast is afforded by the persistently erect trunk of *Tsuga Pattoniana*, the western hemlock, which grows with the preceding, but becomes erect no matter how strong the wind, nor how much its flexile trunks while young are decurved each winter by the snow. Several other pines were exhibited as *P. contorta* and its erect form of the interior known as *P. Murrayana*. Among Alaskan trees *Picea Sitchensis*, and the Alaska Cedar were discussed.

EDWARD S. BURGESS,
Secretary.

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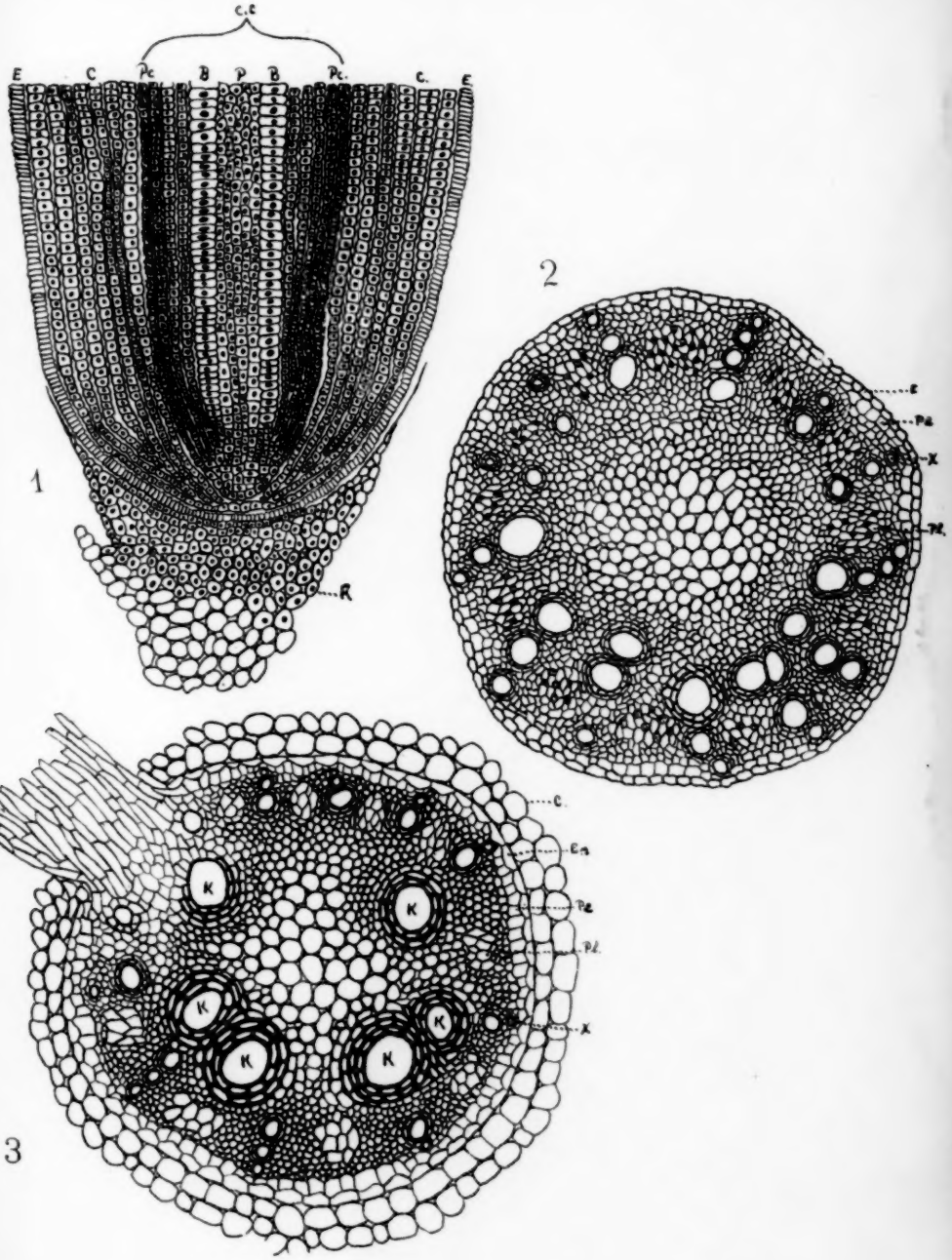

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